Physician Participation in Medicaid

John E. Kushman

An economic model of the physician's choice whether or not to treat patients in the Medicaid program is presented. Hypotheses derived from the model are tested using data from California's Medicaid program. Variations in physician participation between urban and rural areas and the associated variations in access to care are examined. The impacts of federal and state health manpower programs on physician participation and access to care are discussed.

This paper presents an economic model of a physician's choice whether or not to participate in Medicaid and evaluates empirical evidence on variations in participation among regions of California. A profit-maximization model of the physician firm is used in which services may be sold in the Medicaid market at a reimbursement rate below the private patient fee. It is argued that the reimbursement system employed in California produces predictable variations in physician participation among regions of the state. Specifically, participation varies with the general population's demand for physician services and the proportion of the population eligible for Medicaid.

Hypotheses derived from the model are tested using data from the California Medicaid program, Medi-Cal, for 1973 and 1974. A regression equation explains most of the variation in participation among regions. Support for the profit-maximization model is mixed with most of the variables having the predicted signs.

The basic purpose of this study is to discover determinates of the level of physician participation in Medicaid and, thereby, the availability of care to the eligible population. Of special interest is whether rural areas have relatively high or low participation and what area characteristics contribute importantly to the rural-urban differential. The empirical results also provide insights on the impacts of federal and state programs to increase the quantity of health care resources in rural areas and to increase the proportion of physicians in primary care specialties.

A Model of Physician Participation

A major purpose of the Medicaid program is to make medical services accessible to low-income persons in the same fashion that they are accessible to the general population. It is important for a high proportion of physicians to treat Medicaid patients so that they are not concentrated in county hospital outpatient departments, emergency rooms, or "Medicaid mill" clinics.

Medicaid's goals have been difficult to attain in a period when inflation has drastically reduced state governments' ability to finance their share of expenditures.[1] States with budgetary pressure have deleted services from coverage, reduced the number of eligibles, and frozen reimbursement rates. California has maintained a relatively generous program. Eligibility for Medi-Cal has included many persons, and almost all physician services are covered. On the other hand, during the study period reimbursement rates

John E. Kushman is an assistant professor of agricultural economics at the University of California at Davis. This research was supported in part by a Faculty Research Grant from the University of California.

[1]Davis has shown that Medicaid has been quite successful in increasing the quantity of physician services consumed by eligibles, but program benefits are not evenly distributed among eligibles.

were frozen at levels far below private patient fees.

Evidence is presented in the appendix that the Medi-Cal reimbursement system provides for little variation in reimbursement rates among regions of the state. This was the case even though the system was originally intended to allow higher reimbursement rates in areas with high private patient fees. During the study period reimbursement rates were probably much as they would have been under a statewide schedule of maximum allowances that were considerably lower than private fees. Holahan has shown that schedules of allowances reduce Medicaid expenditures for physicians' service relative to other reimbursement systems, but there is no evidence on the willingness of providers to treat eligibles under these systems. For instance, it is plausible that in areas of greater private demand for physicians' services MediCal reimbursement rates are higher to maintain participation.

A statewide schedule does not provide the needed variation in reimbursement rates among geographic areas, so it may produce variations in participation and in the accessibility of care. California began using a statewide schedule of maximum allowances in late 1976. There is insufficient data to evaluate variations in participation with the new schedule, but analysis of participation under the previous system should indicate what to expect. A recent study by the National Academy of Sciences recommended removal of reimbursement rates that vary among regions [U.S. House, p. 10], and more states may adopt schedules of maximum allowances to cut expenditures.

A model of the physician's decision whether or not to accept Medi-Cal patients is presented in Figure 1. The individual physician is assumed to maximize profits and faces a downward-sloping demand curve DD for private services with marginal revenue MR. Private patient demand is downward-sloping because consumers lack information about the prices and technical efficacy of alternative practitioners [Newhouse and Sloan, p. 578]. Desire for continuity of care, the development of trust between patient and physician, and the cost advantage of a physician who has the patient's accumulated medical history also enable individual physicians to charge fees above the mean fee in their area without drastic reductions in demand for their services.

Marginal cost is represented by curve MC. In the absence of the Medi-Cal program, profit is maximized by producing quantity Q_0 and charging price P_0. The Medi-Cal reimbursement rate is represented by line R. The height of R represents average and marginal revenue in the Medi-Cal market. At Q_0 the reimbursement rate is greater than marginal revenue in the private market. The physician can increase profit by reallocating some services from the private market to Medi-Cal. Profits are maximized when private services are Q_1 at price P_1 and Medi-Cal services are $Q_2 - Q_1$. At Q_2, marginal cost is equal to marginal revenue in the Medi-Cal market.

As the Figure is drawn, the physician participates in Medi-Cal. Quantity in the private market is lower and price is higher than in the absence of Medi-Cal. Furthermore, an increase in the Medi-Cal reimbursement rate reduces quantity and increases price to private patients. With a constant reimburse-

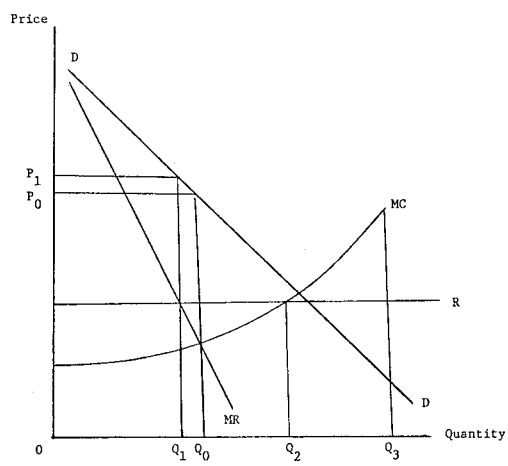

FIGURE 1: A Model of Physician Participation in Medicaid

ment rate an upward shift in demand and marginal revenue may cause MR to intersect MC above R. In that case the physician chooses not to participate in Medi-Cal. It follows that when the reimbursement rate is the same in all regions, participation in Medi-Cal is negatively related to the private demand for services to the individual physician.

Physician participation may also be related to the number of persons in the population who are eligible for Medi-Cal. In Figure 1 the profit-maximizing output is Q_2. When there are many eligibles, physicians may have difficulty restricting services to the profit-maximizing level. Price rationing is not available in the Medi-Cal market, and professional ethics restrain nonprice rationing. In an area with many eligibles, a participating physician may be forced to an output in excess of Q_2, for instance, Q_3. When the losses, as represented by the area below MC, above R, and to the right of Q_2, are great enough, the physician maximizes profit by ceasing to participate and moving back to Q_1. In general, more eligible persons per physician may mean fewer participating physicians.

Empirical Hypotheses

Data are not available to estimate the functions in the model, but several hypotheses can be derived and tested with existing data. The dependent variable is defined as the proportion of nonfederal physicians engaged in patient care in a region who filed claims with Medi-Cal any time during a year. The number of physicians filing claims is measured by the number of physician-provider identification numbers under which claims were filed for 1973 or 1974. Data on provider-numbers were provided by the Office of the Auditor General for 11 regions of California. The data for 1973 and 1974 were pooled to obtain 22 observations.[2] The number of providers filing claims was divided by the number of nonfederal physicians engaged in patient care in the region as of December 31 of 1972 or 1973.[3] The proportion of physicians making claims, called the participation rate, ranges from 56 percent to 100 percent.[4]

The appendix presents evidence that the reimbursement rate is approximately constant among regions and over time. It is assumed also that there are fixed proportions in production and that nonphysician costs do not vary among regions.[5] Costs include the minimum value the physician imputes to foregone leisure. An increasing marginal wage for physician hours is the source of rising marginal costs. It is assumed that the physician's marginal wage is the same among regions at a given number of work hours.

With the same cost function and reimbursement rate among regions, physician participation is determined by the private demand for care and the number of persons eligible for Medi-Cal. In general, private demand to the individual physician is a function of ability to pay, distance to care, and number of physicians per capita.

[2]A list of regions and their counties is available from the author on request. Forty-seven of 58 counties were included. A "provider" may be a physician, a medical corporation, or a group practice. Provider numbers do not correspond exactly to the number of physicians treating claims. To test for potential bias in estimation, the proportion of claims filed under corporate or group numbers in a region was regressed on each of the independent variables in the text. No significant relationships were found and any measurement error is assumed uncorrelated with the independent variables.

[3]Data on physicians were provided by the California Medical Association. The data do not perfectly measure the number of physicians who could have filed claims since physicians may have entered or left the area and, in rare cases, federal, inactive, or physicians whose primary activity is not patient care may have filed claims.

[4]The computed maximum is actually 103 percent as a result of measurement errors discussed in notes two and three above. For purposes of exposition, the maximum was truncated at 100 percent.

[5]The assumption appears to be fairly accurate. Nonphysician costs per visit differ by only 50 cents between nonmetropolitan areas and metropolitan places of less than 1,000,000 persons for general practitioners (computed from American Medical Association data).

Ability to pay for care is measured by per capita income.[6] An increase in income shifts demand and marginal revenue up in Figure 1 and decreases participation. An increase in the distance to care shifts demand down by increasing time and travel costs to obtain care. Distance is measured by the percent of the population residing in urban areas [U.S. Department of Commerce]. Urban dwellers are expected to be closer to physicians, and urbanization should be related negatively to participation. More physicians per capita spreads the population among more providers, shifts demand to the individual physician down and increases participation. Given the physician-population ratio, (hereafter, "physicians") an increase in the percent of the population eligible for Medi-Cal (hereafter, "eligibles") may cause some physicians to leave the program rather than treat a large number of Medi-Cal patients. Hence eligibles are related negatively to physician participation.[7]

The empirical model also includes the percent of physicians who are in general practice (hereafter, "GP"). There is consensus that general practitioners have become particularly scarce. That is, a high proportion of physicians are specialists whose productivity is relatively low because they can only deal with a narrow group of diseases or anatomical systems.[8] An increase in GP is equivalent to an increase in physicians in the present model which will increase participation.

The Results

Column one of Table 1 shows ordinary least squares estimates of a linear regression equation with the physician participation rate as dependent variable. The equation explains almost three-fourths of the variation in participation.

Disregarding the constant, one-tail tests are appropriate for the variable coefficients. Four of the five coefficients have the predicted signs and are statistically significant at a five percent level. Two are significant at a one percent level. Physician participation is related positively to physicians and GP, and negatively to urbanization and eligibles.

Income has a positive coefficient, contrary to the model's prediction, and the coefficient would be significant at five percent in a two-tail test. This result may indicate that the model is inappropriate or that the assumptions are not valid. Medi-Cal reimbursement rates may be sufficiently higher in high income regions to increase participation, although evidence in the appendix suggests that the correlation between income and reimbursement rates is weak.

The positive coefficient could arise from misspecification of the empirical model. First, it may be necessary to distinguish between wage and nonwage income. If physician services are a normal good, nonwage income has only an income effect with a positive influence on private demand and, presumably, a negative effect on physician participation. Wages have income and substitution effects on the demand for services. Physician visits are a time-intensive consumption activity. A higher wage rate increases the worker's command over all goods and services but simultaneously increases the relative price of time-intensive consumption. Grossman [pp. 55-73] shows that the wage rate may be related negatively to the demand for medical care which would occur if the substitution effect dominates. If variations in income in the sample reflect primarily differences in wage rates, income could be associated negatively with private demand for physician visits and positively with participation in Medi-Cal. Unfortunately no data on nonwage income and wage rates are available.

[6]Data on population and income were provided by the California Board of Equalization.

[7]Data on eligibles were provided by the California Department of Health, Center for Health Statistics.

[8]See, for instance, various statements before the California Assembly Select Committee on Health Manpower and remarks of Schwarz. GP (including family practice) is computed from California Medical Association data.

TABLE 1. Regression Equations for Physician Participation Rate

Variable	Coefficients[a] 1	2	3
Constant	0.72411	0.27849	0.34121
	(2.71)	(0.456)	(0.831)
Per Capita Income	0.07437	0.12221	0.12310
(in 1,000's)	(2.35)	(3.2999)	(3.47)
Percent of Population	−0.00450**	−0.00643**	−0.00666***
In Urban Areas	(2.27)	(2.52)	(3.49)
Physicians Per 1,000	0.19353***		
Persons	(3.90)		
Percent of Physicians	0.00834**	0.00066	
in General Practice	(1.94)	(0.142)	
Percent of Population	−0.02913***	−0.02301**	−0.02349**
Eligible for Medi-Cal	(4.47)	(2.57)	(2.92)
Index of Medical		0.01965*	0.00987**
Underservice		(1.67)	(1.79)
R^2	0.736	0.562	0.561

[a] T-statistics are in parentheses.

***Significant at one percent in the one-tail test indicated by the text.

**Significant at five percent in the one-tail test indicated by the text.

*Significant at ten percent in the one-tail test indicated by the text.

Another plausible explanation of the positive coefficient for income is that income is positively correlated with physician substitutes. Areas with high income probably also have relatively large quantities of hospital beds, outpatient departments, and clinics. These resources all act as physician substitutes, reducing private demand for physicians and increasing participation in Medi-Cal.[9] Hence, the positive coefficient for income could reflect the correlations of physician substitutes with income and participation. A similar spurious correlation could result if high income areas have populations which are relatively healthy and demand little medical care. A decrease in private demand would cause greater participation.

Introducing a number of variables for physician substitutes and population health status into the regression equation would provide a check for spurious correlation between participation and income. The list of potential variables is long (age and sex variables, morbidity or mortality data, hospital beds, outpatient departments). Introducing even a few would reduce the degrees of freedom, and would probably increase multicollinearity which is already troublesome.

Fortunately, there is a single variable which can be entered into the regression to test for bias in the income coefficient. The Index of Medical Underservice is a multiattribute utility model which predicts the evaluations of health care experts on the extent to which an area has health care resources relative to the medical needs of its population. The development and validation of the Index are discussed in the appendix.

The Index provides a single measure which includes physicians, physician substitutes, and dimensions of population health status. Physicians per 1,000 persons was replaced in the regression equation by the Index. If correlations between income and physician substitutes and between income and health status cause the positive income coefficient, the coefficient may be more negative with the Index. The new estimates are reported in column 2 of Table 1. The income coefficient is more positive and has a greater t-value than

[9]Davis and Russell attempted to estimate the extent of substitution among hospital inpatient care, outpatient care, and physicians' services. Their effort suffered from severe multicollinearity, and they were unable to attach much confidence to the results.

TABLE 2. Measures of Importance of Policy Variables for Variations in Physician Participation.

Variable	Elasticity at the Means	Standardized Regression Coefficient	Percent Change Between Extreme Sample Values
Physicians Per 1,000 Persons	0.335	0.876	37.7 (2.51)
Percent of Physicians in General Practice	0.249	0.561	37.4 (4.61)
Percent of Population Eligible for Medi-Cal	−0.361	−0.727	44.2 (3.97)

[a]Figures in parentheses are the ratios of maximum to minimum sample value for 1974.

in column 1. Although this test is not conclusive, it tends to indicate that spurious correlation with physician substitutes and health status is not responsible for the positive income coefficient.[10]

The coefficient of GP is insignificant in column 2, probably indicating that this variable's information has been absorbed by the Index. In that case, a more appropriate specification is needed. Column 3 shows the estimates when GP is omitted. The coefficient for the Index is sensitive to the exclusion, but the other coefficients change very little.

The data appear to support the model except for the positive association between participation and income. The available evidence suggests that the sign of the income coefficient is not due to the correlation of income with physician substitutes and health status. No data were available to check for bias from correlation of income with wage rates, the price of time used to consume medical care.

Physician Participation and Public Policy

Of the variables in the regression equation, physicians, GP, and eligibles are objects of public policy. In this section various measures of the relative "importance" of the policy variables for changing participation are examined. The effects on physician participation of federal and state programs are discussed with particular emphasis on their impacts in rural areas.

The relative importance of the policy variables for influencing participation can be examined from several perspectives. Economists commonly consider elasticities which in this case give the percentage change in the participation rate for a one-percent change in a policy variable. The elasticities of physician participation are contained in column 1 of Table 2. Participation appears most responsive to eligibles, physicians, and GP's in that order.

Another measure of the effectiveness of policy variables is the relative size of their standardized regression coefficients. A standardized regression coefficient indicates by how many standard deviations the dependent variable changes when an independent variable changes by one standard deviation. Each variable is deflated by a measure of its variability in the sample. The standardized coefficients for the policy variable are in column 2 of Table 2.

As a guide to public policy, an elasticity or a standardized regression coefficient is incomplete. The variable with the greatest elasticity also may be the most costly to change. Likewise, the relative costs of changing variables by one standard deviation must be compared with the relative size of standardized regression coefficients to determine which variables are most cost-effective. In the present case, GP is less effective than physicians in changing the physician participation rate whether effectiveness

[10]Positive correlations between urbanization and physician substitutes, and health status could also bias the coefficient of urbanization positively. The coefficient is more negative when physicians per capita is replaced by the Index, suggesting the presence of some bias.

is judged by the elasticity or standardized coefficient. The cost of changing GP, however, may be less than the cost of increasing physicians. The costs of decreasing eligibles are difficult to evaluate. The federal government mandates the eligibility of persons in several federal assistance programs (e.g., Aid to Families with Dependent Children, Aid to the Blind). About 16 percent of eligibles were added by the state and could be dropped at the state's discretion. A 16 percent decrease in eligibles would bring 47 of 100 physicians into the program. The cost would be a reduction in care received by families with relatively great medical need and little ability to pay. The public good nature of this care makes it difficult to value its loss.

A different way of looking at the importance of the policy variables is to ask how much variation in each contributes to variation in the participation rate among regions. One answer is provided by calculating the predicted participation rate at the sample means for all but one variable, entering the remaining variable at the sample values least and most favorable to participation, and calculating the percentage change in predicted participation between the extreme values. Intuitively, this procedure gives a measure of the importance of observed variations in the policy variables for participation.[11] These percentages are presented in column 3 of Table 2. According to this measure, all the policy variables are about equally important.

From these data it can be concluded that the proportion of physicians participating in Medi-Cal is more responsive to physicians and eligibles with lesser responses to GP. The choice of the most cost-effective tool for increasing participation could be based on these data if the costs of manipulating each variable were known. The observed variation in participation is explained about equally by the sample range for each policy variable.

The percentage of physicians in general practice is ranked higher by the last measure of importance than by any other measure because, although it elicits the least response to a one-unit change, it shows the most pronounced variation over the sample. In column 3 of Table 2 the ratios of the sample maximum to the sample minimum are presented in parentheses. The maximum for GP is over 4.5 times the minimum.

[11]Evaluated with the least favorable value as the base.

TABLE 3. Mean Values for Variables in Metropolitan and Nonmetropolitan Counties of California and Associated Differences in the Proportion of Physicians Participating in Medi-Cal.

	Means		
Variable	Metropolitan	Nonmetropolitan	Difference in Proportion of Physicians Participating
1974 Per Capita Income (in 1973 dollars)	3816	3020 (1.26)	−.059
Percent of Population in Urban Areas	83.2	35.9 (2.32)	.213
Physicians Per 1,000 Persons	1.54	0.85 (1.81)	−.134
Percent of Physicians in General Practice	20.6	53.7 (2.61)	.276
Percent of Population Eligible for Medi-Cal	9.9	10.9 (1.10)	−.029

[a]Figures in parentheses are the ratio of the metropolitan and nonmetropolitan means with the greater value in the numerator.

[b]Calculated by subtracting the metropolitan mean from the nonmetropolitan mean and multiplying by the coefficient from column 1 of Table 1.

It should not be surprising that the maximum value of GP occurs in the most rural region in the sample and the minimum is in one of the three most urban regions. Rural areas have a larger proportion of general practitioners because they tend to have a higher proportion of older physicians who were trained before specialization became the rule and because they do not have sufficient population and sophisticated facilities to support many specialty practices. In Table 3 the mean values of the independent variables are presented for the metropolitan and nonmetropolitan counties of California along with the differences in the participation rate associated with the differences in means. The ratios of the larger to the smaller of the means is given in parentheses as an indicator of the difference between metropolitan and nonmetropolitan areas. The variables which show the greatest proportional differences are also responsible for the greatest change in the participation rate. Of the policy variables, GP accounts for the largest difference in the participation rate, followed by physicians and eligibles.

Table 3 indicates that the participation rates of metropolitan and nonmetropolitan areas may differ substantially. The predicted participation rate is 0.81 for a "typical" metropolitan county and 1.00 for a typical nonmetropolitan county.[12]

The predicted participation rates show that nonmetropolitan persons in California who were eligible for Medi-Cal had a higher probability of contacting a participating physician than their metropolitan counterparts, given that both contacted a physician. It is not safe to assume, however, that metropolitan and nonmetropolitan eligibles are equally likely to contact a physician. Eligibles in nonmetropolitian areas are probably poorer than those in metropolitan centers, have longer travel distances for care, and find fewer physicians per capita in nonmetropolitan counties. Estimates using predicted participation rates and mean values of physicians and eligibles indicate about 12 participating physicians per 1,000 eligibles in metropolitan counties versus eight per 1,000 nonmetropolitan counties.[13] Clearly nonmetropolitan eligibles have less access to participating physicians, even with a much higher participation rate in their areas.

Since the nonmetropolitan participation rate is already very high, the most obvious course for increasing the accessibility of Medi-Cal services in nonmetropolitan areas is to increase the number of physicians per capita. A number of federal programs, culminating in the first comprehensive Health Manpower Training Act of 1971, sought to increase the overall physician-population ratio. There is no dispute that the programs were successful. In California, for instance, the ratio of active, patient-care, nonfederal physicians to population increased from 158.0 per 100,000 persons in 1963 to 198.7 in 1975. Now there is considerable sentiment that the U.S may have a surplus of physicians (however defined) in the near future.

Rural residents, however, have not benefited equally with their urban counterparts. For rural and semirural areas of California the physician-population ratio fell from 99.7 per 100,000 in 1963 to 73.0 in 1975 [California Medical Association, Jan.-Feb. 1977, p. 3]. A major federal initiative to redistribute physicians toward rural and inner-city areas has been incorporated into the National Health Professions Educational Assistance Act of 1976 [Public Law 94-484]. The Act significantly increases support for the National Health Services Corps, which pays school expenses and support for medical students in return for service in physician-shortage areas, and stiffens the terms under

[12]Computed using the means values and truncating at 1.00.

[13]Calculated as $\frac{\text{Participating Physicians}}{\text{Eligibles}} = \frac{\text{Participating Physicians}}{\text{All Physicians}} \cdot \frac{\text{Physicians}}{\text{Population}} \left(\frac{\text{Eligibles}}{\text{Population}}\right)^{-1}$

The sample contains one region which is entirely nonmetropolitan, and the participation rate for that region averages 0.98 for the sample years.

which graduates can buy out of their service obligation.[14] Public Law 94-484 also provides for forgiveable loans to students who agree to practice in underserved areas. There are stringent conditions for buying out of the practice commitment.[15] The new law expanded the Area Health Education Centers program — a program for locating training centers away from the main medical school campuses to familiarize students with practice in physician-shortage areas.

In addition to programs for increasing the number of physicians in rural areas, the federal government is attempting to coordinate the resources already present and to make them more productive. The principal coordinating effort is the Rural Health Initiative which seeks to integrate the work of the National Health Service Corps, the Migrant Health Program, the Community Health Centers Program, the Appalachian Health Program, and the Health Underserved Rural Areas Program.[16] By increasing the productivity of available resources, the Rural Health Initiative may mitigate the need for more health care resources, including physicians, in rural areas.

The federal programs are to be supplemented by state programs in California. In 1976 a California Health Service Corps was established to hire health professionals to provide care in underserved rural areas. An effort was launched to coordinate state rural health programs, and a program of demonstration projects in rural health care delivery was established[17] [California, *Statutes*, Ch. 1196]. Parallel to the federal Area Health Education Centers program, the Song-Brown Family Physician Training Act of 1973 as amended in 1975 requires participating residency programs to prepare their graduates to practice in medically underserved areas and to include some training in such areas [California Health Manpower Policy Commission, p. 13].

There is some evidence that federal and state efforts encouraging physicians to practice in rural areas are paying off. Between 1973 and 1975 the physician-population ratio in California as a whole increased 6.9 percent. For metropolitan counties the mean increase was 7.9 percent, but for nonmetropolitan counties the mean increase was higher at 9.2 percent.[18]

The relatively high percentage of physicians in general practice in rural areas is partly responsible for the high participation rate in those areas. Federal and state programs must be directed toward replacing older general practitioners who retire with similar new physicians in order to maintain a high participation rate. Public Law 94-484 is a dramatic step toward the required specialty composition of new graduates. It requires medical schools, which receive federal capitation grants, to have 35 percent of their filled residencies nationally in the primary care areas of family medicine, general internal medicine, and general pediatrics by 1978.[19] If the national percentage for 1978 is not met, each medical school will have to achieve even higher percentages in later years to receive federal capitation payments. California has had a program encouraging the training of family practice specialists since 1973 under the Song-Brown Act. Between 1973 and 1975 the number of nonfederal physicians in internships or residencies in

[14]Scholarship recipients who default on their service obligation pay triple the amount of the scholarship plus the prevailing interest rate within one year of default. The cost of buying out is approximately $130,000 for a private school graduate and $73,000 for a public school graduate [California Medical Association, March 1977, p. 3].

[15]The conditions are very similar to those for buying out of the National Health Service Corps (see footnote 14).

[16]For a discussion of the Rural Health Initiative and its related federal programs, see USDHEW and Cooper.

[17]The federal Health Underserved Rural Area program is the parallel research and development program for methods of delivering and financing rural health care.

[18]Calculated from data presented in California Medical Association, December 1976.

[19]The primary care specialties are expected largely to replace general practice as the first contact with the health care system, the source of comprehensiveness and continuity of care, and the coordinator of specialty services.

general or family practice in California increased 48 percent [California Medical Association, December 1976].

Conclusions

The economic model of the physician's choice whether to participate in Medicaid received mixed support from the data. A regression equation suggested by the model explained three-fourths of the variation in the participation rate among regions of the state. Four of the five variables included in the equation had coefficients with the signs predicted by the model, and the coefficients were statistically significant at conventional levels. The coefficient of per capita income, however, had a positive sign — opposite of that expected. The positive income coefficient may have resulted from a failure to separate wage and nonwage income or from omitting per capita health care resources aside from physicians.

Experimentation with the Index of Medical Underservice as a regression variable cast doubt on the omission of physician-substitutes as the reason for a positive income coefficient. The available data did not permit the separation of wage and nonwage income. Likewise, there are insufficient data to evaluate whether higher reimbursement rates in high income areas were responsible for the positive income coefficient. Overall, the model definitely shows sufficient explanatory and predictive power to be reexamined when sufficient data are available from the new Medi-Cal reimbursement system. The new system eliminates geographical differences in reimbursement, so that there is no association between reimbursement rates and per capita income.

The regression results suggest that a much greater proportion of physicians participate in Medi-Cal in nonmetropolitan than metropolitan areas, but persons eligible for Medi-Cal have less access to care in nonmetropolitan areas because of low physician-population ratios. Federal and state programs to increase the physician-population ratio and to produce a greater proportion of primary care specialists appear to have important and favorable impacts on the accessibility of care. Tentative evidence shows an improvement in the number of physicians in rural areas and dramatic shifts toward primary care among new physicians will help to maintain the high rural participation rate.

References

American Medical Association. Center for Health Services Research and Development. *1974 Profile of Medical Practice.* Chicago: American Medical Association, 1974.

California. Assembly. Select Committee on Health Manpower. *Distribution of Physicians Hearings* before the Assembly Select Committee on Health Manpower. San Francisco, July 9, 1973.

California. Department of Health, Rates and Fees Section. *Proposed Physician Reimbursement.* Sacramento: Department of Health, November 1974.

California Health Manpower Policy Commission. *The Second Annual Report to the California Legislature.* Sacramento: Health Manpower Development Section, December 15, 1975.

California Medical Association. Division of Research and Socioeconomics. *Access to Health Care and Federal Health Manpower Policy — Part I.* Socioeconomic Report, Volume 17, No. 1. San Francisco: California Medical Association, January-February 1977.

California Medical Association. Division of Research and Socioeconomics. *Access to Health Care and Federal Health Manpower Policy — Part II.* Socioeconomic Report, Vol. 17, No. 2. San Francisco: California Medical Association, March 1977.

California Medical Association. Division of Research and Socioeconomics. *The Physician Fee Index and Other Measures of the Economy, June 1976.* Socioeconomic Report, Vol. 16, No. 6. San Francisco: California Medical Association, September 1976.

California Medical Association. Division of Research and Socioeconomics. *Physician Participation in the Medi-Cal Program: Highlights of Findings From a 1977 Survey — Part II.* Socioeconomic Report, Vol. 17, No. 4. San Francisco: California Medical Association, June 1977.

California Medical Association. Division of Research and Socioeconomics. *Physician Supply in California — December 1975.* Socioeconomic Report, Vol. 16, No. 8. San Francisco: California Medical Association, December 1976.

California. Office of the Auditor General. *Report on Provider Participation in the Medi-Cal Fee-For-Service Program.* Sacramento: Office of the Auditor General, May 1975.

California. *Statutes.* Chapter 1196, 1976.

California. *Statutes.* Chapter 1207, 1976.

Cooper, Theodore. "The Federal Role in Rural Health." *Summary: 29th National Conference on Rural Health held in Phoenix, Arizona, April 7-9, 1976.* American Medical Association, 1976.

Davis, Karen. "Medicaid Payments and Utilization of Medical Services by the Poor." *Inquiry,* 13 (June 1976): 122-135.

Davis, Karen and Louise B. Russell. "The Substitution of Hospital Outpatient Care for Inpatient Care." *The Review of Economics and Statistics,* 54 (1972): 109-20.

Grossman, Michael. *The Demand for Health: A Theoretical and Empirical Investigation.* New York: National Bureau of Economic Research, 1972.

Haug, J. N. and G. A. Roback. *Distribution of Physicians, Hospitals, and Hospital Beds in the U.S., 1967.* Chicago: American Medical Association, 1968.

Health Services Research Group. *The Development of an Index of Scarcity Of Health Services for Use in the Federal HMO Program.* University of Wisconsin, April 1975a.

Health Services Research Group. "Development of the Index of Medical Underservice." *Health Services Research, 10 (Summer 1975b): 168-180.*

Health Services Research Group. Interpretation of the New York City Data — April 1975. University of Wisconsin, undated.

Holahan, John. "Physician Availability, Medical Care Reimbursement, and Delivery of Physician Services: Some Evidence from the Medicaid Program." *Journal of Human Resources,* 1 (Summer 1975): 378-402.

Kushman, John. "The Index of Medical Underservice as a Predictor of Ability to Obtain Physicians' Services." *American Journal of Agricultural Economics,* 59 (February 1977): 192-197.

Newhouse, Joseph P. and Frank A. Sloan. "Physician Pricing: Monopolistic or Competitive, Reply." *Southern Economic Journal,* 37 (April 1972): 557-580.

Nuckton, Carole Frank and John E. Kushman. *The Index of medical Underservice: Historical Background and Theoretical Foundations with Computations for Northern California.* Giannini Foundation Information Series in Agricultural Economics, No. 76-1. Berkeley: University of California, December 1976.

Schwarz, M. Roy. "What Are the Issues in Rural Health?" *Summary: 29th National Conference on Rural Health Held in Phoenix, Arizona, April 7-9, 1976.* American Medical Association, 1976.

U.S. Congress. House. Subcommittee on Health of the Committee on Ways and Means. *Medicare-Medicaid Reimbursement Policies,* Social Security Studies Final Report Submitted by the Institute of Medicine of the National Academy of Sciences. Committee Print. Washington, D.C.: Government Printing Office, 1976.

U.S. Department of Commerce, Bureau of the Census. *Census of the Population: 1970, General Social and Economic Characteristics.* Washington, D.C.: U.S. Government Printing Office, 1972.

U.S. Department of Health, Education, and Welfare. Public Health Service. Health Services Administration. *Rural Health Initiative: Program Guidance Material for RHI/HURA Grants.* Rockville, Maryland: U.S. Department of Health, Education, and Welfare, December 1976.

Appendix

The Medi-Cal Reimbursement System

During the study period California's Medicaid reimbursement system comprised three tiers [Department of Health]. Level One was based on the charges made by individual physicians to commercial insurance carriers in 1968. For each physician the Level One control was the 51st percentile of his charges for each procedure. Level Two was the 60th percentile of the Level One controls for the physician's county. In some cases contiguous counties were combined to get a sufficient number of physicians for a meaningful profile. Level Three was based on the California Relative Value scale units

rather than individual procedures. The relative value scale defines each procedure as a number of relative value units based on expert evaluations of the resources used in the procedure. The value of a unit was determined by the 60th percentile of per-unit charges made to insurers in 1967. The Level Three control for a procedure was the area unit value times the units represented by the procedure.

The amount paid to a physician was the lower of the amount billed and Level One or Level Two if the physician had an individual profile from 1968 or Level Two or Level Three if the physician had not been present in 1968. In the latter case Level Three was generally the operative control since the 1967 base made it lower than Level Two.

The reimbursement system was intended to allow some flexibility for paid amounts to vary with private patient fees across the state. There are no data available on private fees for all physicians, but there are data for the mean amounts paid by Medi-Cal in 1973 for counties. The coefficients of variation for paid amounts are 0.06, 0.11, 0.14, and 0.07 for an appendectomy, a routine obstetrical delivery with postpartum care, an annual examination for an adult, and a hospital visit respectively.[20]

Amounts paid by Medi-Cal appear to vary among counties, but not greatly. Data are also available on mean amounts billed to Medi-Cal for counties. Physicians are instructed to bill Medi-Cal according to their private patient fees, so billed amounts should reflect private fees. They will reflect private fees, however, only for physicians who participate in Medi-Cal. In areas with relatively high private fees, a smaller proportion of physicians will likely participate in Medi-Cal. Assuming that the participating physicians in an area are the subset with relatively low private fees (i.e., private fees nearest the Medi-Cal reimbursement level), the correlation between mean amounts paid by Medi-Cal and mean private fees for the participating subset of physicians will be greater than the correlation between mean amounts paid and mean private fees for all physicians. The correlation coefficients between mean amounts billed and paid for the four services listed above are 0.48, 0.68, 0.83, and 0.24 in the same order. Overall, mean amounts billed and paid were positively correlated, but the extent of association does not appear to have been great.

Another indication of the variation in Medi-Cal reimbursement rates across regions is the variation in the Level Three unit values across areas. Level Three was the operative control for physicians who were not present in 1968. A lower bound on the number of physicians under Level Three is given by the 12 percent of physicians present in 1973 who represent an increase over the number of physicians in December 1967.[21] At least 12 percent of the physicians present in 1973 were subject to Level Three since the increase in numbers does not account for replacement of physicians who retired or moved. Level Three unit values showed very little variation over areas. For instance, the coefficient of variation for county unit values in the "medical" procedures was only 0.055. For "surgical" procedures it was 0.064.[22]

Overall, the reimbursement system showed some flexibility. Mean amounts paid were positively correlated with private patient fees. There appears, however, to have been considerable "stickiness" such that rates did not fully reflect private fee differences. In part, the stickiness was caused by the number of physicians who were subject to Level Three controls. Reimbursement rates, regardless of the applicable control level, were much lower than private fees. The profiles were increased by 2.5 percent in 1972

[20]Data were provided by Jim Taylor, Rates and Fees Section, Medi-Cal Division, California Department of Health.

[21]Data for 1967 are from Haug and Roback, Data for 1973 were provided by the California Medical Association.

[22]Data was provided by Hank Moody, Rates and Fees Section, Medi-Cal Division, California Department of Health.

(Department of Health, pp. 2-3), but private fees increased approximately 29 percent between 1967 and 1973 and 24 percent between 1968 and 1973.[23]

The regression results in the text raise the question whether reimbursement rates are correlated with per capita income among regions. For 1973 the correlation coefficients between mean amounts paid and per capita income in a county are 0.07, 0.22, 0.34, and 0.13 for an annual examination, and initial hospital visit, an obstetrical delivery, and an appendectomy in that order. The evidence indicates that the correlation between reimbursement rates and income is quite low.

In September of 1976 reimbursement for physicians' services was made subject to a statewide schedule of maximum allowances (SMA). The new SMA represents an average increase over amounts previously paid of 9.5 percent for all physicians' services, 20 percent for primary care services, and 30 percent for maternity care services [California, *Statutes*, Ch. 1207]. It is clear that reimbursement levels will still lag far behind private fees. Private fees increased 81 percent between 1967 and 1976 and 74 percent between 1968 and 1976.[24] Initial evidence on the new reimbursement scheme shows that about half of the participating physicians are being reimbursed at rates no higher than with the previous scheme [California Medical Association, June 1977, p. 2]. The SMA limits will be the universal reimbursement rate and there will be no variation in reimbursement rates among regions of the state.

The Index of Medical Underservice

The Index of Medical Underservice (IMU) was developed by the Health Services Research Group (HSRG) at the University of Wisconsin for the Health Maintenance Organization program. It has been validated as a predictor of expert assessments of several theoretical constructs, including the quantity of health resources relative to need, for areas smaller than a state [HSRG 1975a, 1975b, undated]. The IMU is constructed as a nonlinear combination of four variables, percent of the population below poverty level, percent 65 or older, infant mortality rate, and primary care physicians per 1,000 population. Higher index values represent more resources relative to need.

The IMU is a multiattribute utility model. Briefly, a multiattribute utility model is a mathematical model which predicts the subjective assessments of judges on the extent to which an object possesses some characteristic. We cannot enumerate the many methods for validating an MAU here but it is important to point out that the model can be validated quite independently of its use in regression analysis. Thus, the IMU is not constructed for its "fit" in the regression equation. For a more complete discussion of the IMU and its validity the interested reader may see HSRG1975a, 1975b, undated, Kushman, and Nuckton and Kushman.

[23]Computed from data in California Medical Association, September 1976, p. 3.

[24]See footnote 4.