Physician Participation in Medicaid: Evidence from California

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The objective of this paper is to investigate physician participation in the Medicaid program. In particular, how sensitive is the physician's involvement with Medicaid to variations in Medicaid reimbursements? How important are fee levels in the private market? What is the impact of inflation on the costs of physicians' inputs, particularly if the Medicaid fee remains relatively constant? These questions are explored through an empirical analysis of data from the California Medicaid program. Two aspects of physician participation form the focus of the study: 1) the percentage of physicians participating in Medicaid in a given county and 2) the average number of nonaged, Medicaid patients treated by each participating physician. Information on these variables and on Medicaid fees and private charges come from Medicare and Medicaid claims records for more than 3,000 physicians. The most significant result of the study is the reaffirmation of the importance of the amounts of both private charges and Medicaid payments in determining participation rates and average Medicaid case loads per participating physician. Both dependent variables are, as expected, inversely related to physicians' average billed revenue per patient and are positively related to average Medicaid payments per patient. In addition, it appears that the long-run impact of a change in billed revenue is significantly larger in absolute value than a corresponding change in the amount that Medicaid is willing to pay.

CONCERN over the high cost of medical care and its impact on government budgets has led public officials to seek ways to limit public expenditures for physicians' services. Among the available policy options are ceilings on fees paid physicians out of funds from public programs, primarily Medicaid and Medicare. Unfortunately, cost containment policies of this type may conflict directly with the primary objective of these programs: making affordable, office-based physicians' services available to the poor and the elderly under the same conditions as for other patients.

Even though Medicaid effectively reduces the money price of medical care to zero for those eligible to receive program benefits, it does not require physicians to provide services on demand. As long as we have a dual public/private system that permits physicians to refuse to treat certain patients, subsidizing the demand for care by the poor may not in itself be sufficient to attain desired levels of office-based ambulatory care use. Ironically, creating incentives for the poor to seek care from institutional providers may result in higher total Medicaid costs [1].

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These questions are explored through an empirical analysis of data from the California Medicaid program. Two aspects of physician participation form the focus of the study: 1) the percentage of physicians participating in Medicaid, and 2) the average number of nonaged Medicaid patients treated by each participating physician. Information on these variables and on Medicaid fees and private charges comes from Medicare and Medicaid claims records provided by California Blue Shield, the Medicaid carrier in California. Earlier studies [2,3,4] have had to use proxy or indirect measures of key variables: Medicaid expenditures, billed charges, and Medicaid fees; the research reported in this has the advantage of its detailed data on the number of and mix of services provided Medicaid patients and on individual physicians' charges and reimbursements.

Theory

The theory of the price discriminating firm can be applied to the analysis of Medicaid participation because the physician receives different prices for the same services, even though a single price is charged. A physician's practice will be viewed as a monopolistically competitive firm that sells services in two or more markets. One market consists of patients who purchase services according to a downward-sloping demand schedule. The other markets consist of sets of patients covered by insurance plans, such as Medicaid, Medicare assignment, and Blue Shield's payment-in-full program, which pay physicians predetermined, fixed fees. These are represented by infinitely elastic demand curves set at the fixed fee levels.[2] Production is governed by a standard-shaped cost curve which exhibits increasing marginal cost over the relevant range.

Applying the model to the simple case of one fixed fee market—Medicaid, for example—produces the following inferences:[3]

1. Profits are maximized by setting marginal cost equal to marginal revenue in each market.
2. A shift upward in the marginal cost curve will induce the physician to see fewer Medicaid patients. In fact, Medicaid output will go to zero before the physician raises prices (and presumably reduces quantities) in the private market. If marginal cost intersects marginal revenue above the Medicaid fee, the physician will see no Medicaid patients.
3. Upward shifts in private demand will decrease the quantity of care provided to Medicaid patients, assuming that the Medicaid fee remains constant.
4. An increase in the Medicaid fee level will increase Medicaid output, reduce private output, and raise prices in the private market. In effect, resources are bid toward the public sector. To the extent that there are other public insurance programs competing for physicians' services (e.g., Medicare), public expenditures will go up through both the higher Medicaid fees and the greater liability in the private market. Total output also increases, however.

If participation in Medicaid is defined as providing more than some specified quantity of Medicaid output, then these inferences apply to both the number of physicians participating in Medicaid and the quantity of output per participating physician. But when the physician's desired level of Medicaid output is zero, it does not necessarily follow that he or she should be defined as participating if observed Medicaid output is nonzero. Medical emergencies, a charity motive, or demands by longstanding patients who are temporarily eligible for Medicaid (because of medical indigence, for example), may result in the provision of small quantities of care under Medicaid. In such cases, public charity simply substitutes for private charity.

Empirical Specification

The preceding discussion suggests that participation in the Medicaid program will be positively related to the Medicaid fee level and the size of the potential Medicaid patient pool, but inversely related to private demand and practice costs. Private demand is best measured by the price the physician charges. These observations form the basis of the empirical analysis. This section describes the underlying data base and the dependent and independent variables of the regression models.

Data Base

The primary data base consists of all claims paid by Medicare and Medicaid to a stratified, random sample of 5,003 California physicians over a three-month period (April–June) for each of the years 1972 through 1975. All sample physicians are solo practitioners who maintained the same address throughout the study period.[4] Although all major specialties are represented, only general practice, general surgery, and internal medicine provide sample sizes large enough to permit reliable aggregation by county.

Each claim contains physician and patient ID numbers, a procedure code, the amount billed by the physician, and the amount paid by Medicaid. Billed and paid amounts for each procedure were summed over all claims for each physician and then divided by the number of times each procedure was performed to calculate physician- and procedure-specific average billed and paid amounts.[5] The billed amount is equivalent to the physician's average price for a service; the paid amount, to Medicaid's average fee.[6]

The unit of analysis for the study is the county. Small rural counties were combined into four contiguous rural groups in order to increase the number of sample physicians underlying each observation. In all, there are 30 cross-sectional observations for each specialty for each of four years. All county data not derived from the claims file were obtained from publicly available sources.

Variable Definitions

Dependent Variables. Most discussions of Medicaid participation focus on the simple dichotomous decision of whether the physician treats some minimum number of Medicaid cases. But the extent of physician involvement is at least as important as the dichotomous participation decisions. Therefore, we investigated both Medicaid participation and the average number of Medicaid patients treated per participating physician.

a) Medicaid Participation: In general, a physician is defined as participating if he or she treats more than some specified number of Medicaid patients per unit of time. Ideally, the cut-off level should be chosen to exclude medical emergencies or bona fide char-

ity cases, since we are primarily interested in the effect of Medicaid's reimbursement levels on the willingness of physicians to treat Medicaid-eligible persons. In the absence of reliable data on the average number of medical emergencies and charity cases, the selection of a cutoff point is necessarily arbitrary. For this study, participation is defined as treating ten or more individual Medicaid patients per quarter.[7] The first dependent variable is thus a simple transformation of the number of Medicaid patients seen. For an individual physician, it would take the value of either zero or one. When summed over a group of physicians, the variable becomes the proportion of physicians treating more than ten Medicaid patients per calendar quarter.

b) Medicaid Patients per Participating Physician: The proportion of physicians participating in Medicaid does not fully describe the availability of physicians' services to Medicaid eligibles. If marginal producers—those who see only a few Medicaid patients—drop out of the public market, then availability will not necessarily decrease if their patients are treated by other physicians. To account for this phenomenon, we have defined a second dependent variable, the average number of Medicaid patients treated per participating physician. If this number declines with the proportion of participating physicians, as predicted by the underlying theory, then the implication is that fewer Medicaid-eligible persons are seeing office-based physicians.

Independent Variables. The independent variables of the model are grouped into two sets: price variables and cost shift factors. The first set is constructed from the claims data, while the second is drawn primarily from secondary county data sources.

a) Price Variables: Price variable construction requires selecting an appropriate set of weights for combining the prices associated with individual services. Probably the most logical choice is the frequency with which the various procedures are performed. Using individual physician's actual quantities provided to Medicaid patients is undesirable, on the ground that such weights are selected by the physician as a function of the prices. If this is indeed what these weights represent, it would weaken the assumption that the constructed Medicaid price variable is truly exogenous.

In order to circumvent this problem, we defined a hypothetical Medicaid patient as a vector of procedure quantities, such that each element of the vector is the mean number of units of a particular procedure delivered to *all* Medicaid patients in a geographic area. By choosing sufficiently large areas, for example, by grouping counties into large urban, small urban, and rural sets, one can reasonably argue that the weighted average of fees represents an exogenously determined average revenue which physicians generally would *expect* to receive by treating a Medicaid patient.

Accordingly, the Medicaid price variable is defined as follows. Quantity weights are computed by first grouping all Medicaid claims by physician specialty and type of geographic area (large urban, small urban, and rural), and then calculating the number of units of each procedure per Medicaid patient per quarter, that is,

$$W_{jt} = (\Sigma Q_{1jt}, \Sigma Q_{2jt}, \ldots, \Sigma Q_{njt})/N_{jt}, \quad (1)$$

where W_{jt} is a vector of quantity weights for the jth specialty and tth time period. $Q_1, Q_2, \ldots, Q_n$ are the separate procedures, and N_{jt} is the total number of Medicaid patients. Separate weights are computed for each type of geographic area.

Given the weights, the Medicaid price index is defined as

$$F_{jkt} = f_{jkt} * W'_{jt}, \quad (2)$$

where f_{jkt} is a vector of procedure-specific, exogenous Medicaid fees defined to be comformable with the weights vector.[8] The subscript k refers to the individual county or county group. In effect, this variable measures the average expected revenue per patient per quarter from providing a typical basket of services valued at Medicaid reasonable fee levels.

Price variables for the private market are constructed using the same vector of quantity weights, W_{jt}, but they are combined with physicians' billed charges.[9]

$$P_{jkt} = p_{jkt} * W'_{jt} \quad (3)$$

b) Cost Shift Variables: Expenses for office labor make up the single largest component of solo physicians' direct practice expenses.[10] Although we do not have specific observations of office labor expenses from the physicians in our sample, we can construct a wage proxy using annual county data on total payroll amounts and the number of employees in offices of physicians and surgeons.

Other factors that affect practice costs are the costs of office space and malpractice insurance premiums. No data at the county level are available for the former. An indirect proxy is the county's population size, which we assume will have a positive effect on the office rental rate and on nonlabor office expenses in general.

Malpractice insurance premium rates are available for different levels of coverage according to specialty and region of the state. Although individual physicians' coverage levels are not known, information gained informally from insurance brokers in California suggests that the premium for $1,000,000–$3,000,000 coverage is an acceptable yardstick for the cost of malpractice insurance. Separate rates are available for internists, general surgeons, general practitioners-no surgery, general practitioners-surgery, and general practitioners-obstetrics. Although rising premium rates in California received extensive press coverage in 1976, the years covered by our data are characterized by relatively little premium fluctuation. Furthermore, premiums tend to comprise a fairly small fraction of total expenses, and they showed little cross-sectional variation.

The physician's shadow price of his or her time is also an important cost element. Direct observation of this variable is impossible. However, frequently used proxies are the physician's experience, country of medical school graduation, and board certification status. Data on certification are not available. Experience and graduation from a domestic medical school, which are available for each physician, should be positively related to the physician's implicit wage rate.

c) Size of the Medicaid Market: The last variable in the model measures the size of the potential Medicaid patient pool. An increase in the number of physicians in a county relative to the number of Medicaid eligible persons should, in general, reduce the availability of potential Medicaid patients to any particular physician. This should have a negative effect on both participation and Medicaid patient loads.[11]

Results

Table 2 reports the means and standard deviations of the variables used in subsequent regression analyses. Separate values of the price and output variables are provided for each specialty and for the three specialties combined. Overall, the participation

Table 1:
Variable Definitions

Variable Definition	Short Name	Symbol
A. *Dependent Variables*		
1. Proportion of Sample Physicians Treating More than 10 Medicaid Patients per Quarter*	Percentage Participating	PART
2. Medicaid Patients per Participating Physician, Given at Least 10 Patients*	Patients per Participating Physician	PPMD
B. *Independent Variables*		
Price Variables		
1. Average Revenue per Medicaid Patient per Quarter, Based on Medicaid Reasonable Fees*	Average Medicaid Revenue per Patient	F
2. Average Billed Revenue per Patient per Quarter, Based on Quantities of Medicaid Services*	Average Billed Revenue per Patient	P
Cost Shift Variables		
1. Average Payroll per Employee, Offices of Physicians and Surgeons†	Average Office Payroll	WAGE
2. County Population‡	County Population	SIZE
3. Malpractice Insurance Premiums for $1,000,000–$3,000,000 by Specialty and Area§	Malpractice Premium	MPRM
4. Years since Physician Graduated from Medical School*	MD Experience	EXP
5. Percentage Graduated from a Foreign Medical School*	Percentage Foreign Medical Graduates	FMG
6. Physicians per Thousand Medicaid Nonaged Eligibles‡‖	Physicians per Medicaid Eligible	MDSPE

Sources:

*Blue Shield data file.

†U.S. Bureau of Census, County Business Patterns, California, 1972–1975 editions. SIC 801—Offices of Physicians and Surgeons.

‡State of California, Dept. of Finance, Population Research Unit, "Population Estimates for California Counties."

§Premium information provided by California insurance brokers, Johnson & Higgins of California and Marsh & McLennan, Inc.

‖*Distribution of Physicians in the U.S.*, 1971–1974 editions, American Medical Associations.

Table 2:
Mean Values of Regression Variables by Specialty, 1972–1975 (Standard Deviations in Parentheses)

Variable	General Practice	General Surgery	Internal Medicine	Pooled Specialties
PART	0.51	0.37	0.38	0.42
(Percentage Participating MDs)	(0.32)	(0.18)	(0.20)	(0.20)
PPMD	83.07	38.55	36.22	51.46
(Medicaid Patients per Participating MD)	(48.04)	(21.42)	(20.24)	(39.65)
P($)	28.89	46.31	44.23	39.35
(Billed Revenue per Patient)	(5.99)	(6.33)	(6.61)	(10.14)
F($)	23.01	34.99	33.85	30.54
(Medicaid Revenue per patient)	(4.31)	(3.08)	(4.38)	(6.68)
EXP				22.87
(MD Experience)				(3.69)
FMG				8.94
(Percentage Foreign Medical Graduates				(9.88)
WAGE*				2.61
(Average Salary per Office Employee)				(0.78)
SIZE†				6.97
(County Population)				(12.34)
MPRM‡				29.48
(Malpractice Premium)				(10.19)
MDSPE				15.73
(MDs per Thousand Medicaid Eligibles)				(9.88)

*Thousands of dollars per quarter.
†Hundred thousands.
‡Hundreds of dollars per year.

rate of 42 percent over the four years is somewhat lower than those reported in other studies [5,6,7]. This is probably due to the definition of participation we used and to our exclusion of joint Medicare-Medicaid patients from the analyses. General practitioners have the highest participation rate, 51.3 percent, while general surgeons and internists have approximately equal rates, 36.6 and 37.7 percent. General practitioners treat more than twice as many Medicaid patients per quarter as do either general surgeons or internists. As expected, the average Medicaid payment per patient is considerably lower than average billed revenue, by about 25 percent for general practitioners, 32 percent for general surgeons, and 30 percent for internists.

Linear functions are used to approximate the relationship described in the preceding section. Since billed revenue per patient is an endogenous variable, we used an instrumental variable approach.[12] Preliminary specifications, which included average billed and Medicaid revenues per patient as separate variables, were estimated separately for each of the three specialties. The revenue coefficients of the revenue variables were generally not significant

and frequently had incorrect signs. This appears to be partially due to the relatively small sample size for each specialty and an extremely high correlation between the two revenue variables. (The Pearson correlation coefficient for billed and Medicaid revenue per patient was 0.94 for the pooled specialties.)

Two adjustments were made to lessen the effects of these problems. First, the three specialties were pooled to form a single sample of 356 observations.[13] Specialty-specific coefficients can still be obtained by creating interaction variables which are the product of the revenue variables and specialty dummy variables.

Second, a series of null hyptheses regarding the ratio of the coefficients of the billed and Medicaid revenue variables were posed and tested against the general alternative that the coefficients of the two variables are free to take on any values. Letting

$$Y = \alpha - \beta P + \delta F + \Sigma_i \gamma_i X_i + \mu \quad (4)$$

represent the basic estimating equation, the hypotheses were tested by assuming $\delta = h.\beta$, which transforms equation (4) into

$$Y = \alpha + \beta(P - h.F) + \Sigma_i \gamma_i X_i + \mu. \quad (4')$$

Equation (4′) was estimated for alternative values of h ranging from 0 to 1.5 in increments of 0.1, and an F-statistic computed from the sums of squared residuals for equations (4) and (4′). The hypothesis that $h = 0$, that is, that Medicaid revenue per patient does not influence either the participation rate or the number of Medicaid patients per participating physician, was rejected for both dependent variables ($F_{2,342} = 6.59$ for PART, and $F_{2,342} = 4.14$ for PPMD).[14] Null hypotheses were not rejected for $h = 0.8$ in the participation equation ($F = 2.99$) and for $0.1 \leq h \leq 0.4$ in the Medicaid patients per participating physician equation ($1.33 \leq F \leq 2.39$). Accordingly, the results reported below assume that $h = 0.8$ in the PART equation and $h = 0.25$ in the PPMD equation.[15]

The sampling scheme we used to select physicians resulted in a very uneven number of sample physicians in each county. A probable consequence of this pattern is heteroskedasticity of the error term. Since all physicians selected for the study are solo practitioners, a plausible assumption is that the variance of the error term is inversely related to the number of sample physicians in each specialty and county. Accordingly, all variables are weighted by the square root of the number of sample physicians in the relevant specialty.[16]

Table 3 reports the two-stage, weighted least-squares coefficient estimates. Separate coefficient values are reported for general surgeons in the participation equation and for internists in the Medicaid patients per participating physician equation.[17] Overall, the two equations explain substantial portions of the variation in participation rates and Medicaid case loads. Nine of eleven variables are statistically significant in the participation equation, although one variable (FMG, the proportion of sample physicians from foreign medical schools) has an implausible sign. Fewer variables are significant in the second equation. Specific results are discussed below.

As predicted, the physician's billed revenue per patient has a negative and statistically significant effect on both the percentage of physicians participating in Medicaid and the average number of Medicaid patients treated by a participating physician. The higher the price a physician charges, holding Medicaid payments fixed, the lower the Medicaid participation rate and average Medicaid patient load. The abso-

Table 3:
Coefficient Estimates*

Independent Variables	Dependent Variable: PART† (Percentage Participating MDs)		Dependent Variable: PPMD (Medicaid Patients per Participating MD)	
	Coefficient	Standard Deviation	Coefficient	Standard Deviation
P (Billed Revenue per Patient)				
General Practitioners	−0.0196‖	0.0030	−2.2105‖	0.3689
Internists	−0.0196‖	0.0030	−2.399‖	0.3854‡
General Surgeons	−0.0199‖	0.0032‡	−2.2105‖	0.3689
F (Medicaid Revenue per Patient)§				
General Practitioners	0.0157#	—	0.5526#	—
Internists	0.0157#	—	0.6000#	—
General Surgeons	0.0159#	—	0.5526#	—
EXP (MD Experience)	−0.0057‖	0.0024	0.4233	0.5364
FMG (Percentage Foreign Medical Graduates)	−0.1906#	0.0977	11.3721	22.6244
WAGE (Average Salary per Office Employee)	−0.0542‖	0.0169	1.7223	3.8985
SIZE (County Population)	−0.0008‖	0.0003	0.5016‖	0.0704
MPRM (Malpractice Premium)	0	0.0011	−0.0116	0.2383
MDSPE (MDs per Medicaid Eligibles)	−0.0038‖	0.0008	−0.9479‖	0.1969
YR73(1973 Dummy)	0.0208	0.0212	−1.7011	4.8758
YR74(1974 Dummy)	0.1271‖	0.0293	6.5502	6.5420
YR75(1975 Dummy)	0.2553‖	0.0378	18.0158‖	8.1365
Intercept	0.9363		117.3852	
F(12,343)	17.27		15.96	

*Two-stage, weighted least-squares estimates.

†Participation is defined as treating at least 10 Medicaid patients during the quarter.

‡Standard deviation and test of significance are approximate because these coefficients are the sum of the coefficients of the price variable and a specialty-price interaction term.

§Prior hypothesis tests showed that the Medicaid revenue coefficients are significantly different from zero at the 5 % confidence level.

‖ Significant at 1% confidence level.

#Significant at 5% confidence level.

lute values of the Medicaid revenue variable coefficients are, however, significantly smaller than the corresponding billed revenue variable coefficients in both equations.

The elasticities associated with the revenue variables indicate that these effects may be large. Holding Medicaid payments fixed, a 10 percent increase in average billed revenue per patient, from $39.35 to $43.29, would reduce the average county participation rate by about 19 percent, from 40.8 percent to 33 percent of the relevant physicians in a county, and would reduce average Medicaid patient loads per participating physician by 11.8 percent, from 51.5 Medicaid patients per quarter to 42.5 patients. The combined effect of the reduced participation rate and reduced Medicaid case loads is almost a one-third reduction in the average number of Medicaid patients treated by sample physicians. A 10 percent increase in Medicaid revenue per patient, on the other hand, would have a less than offsetting effect. The participation rate (PART) would increase by about 17 percent, while Medicaid patients (PPMD) would go up by just over 3 percent.

The reader should be cautioned, however, that these quantitative predictions represent long-run adjustment to hypothetical fee changes under the assumption that all other factors are held constant. Short-run responses are likely to be less dramatic. Furthermore, these estimates do not allow for possible changes in the composition or quantity of services per Medicaid patient.

Physician experience (EXP), average salary per office employee (WAGE), county population (SIZE), average malpractice premium for a $1 million–$3 million policy (MPRM), and the proportion of foreign medical graduates in the sample (FMG) are proxies for physicians' implicit own-wage and office costs. All but FMG were predicted to have negative coefficients. The results are consistent with these predictions for EXP, WAGE, and SIZE in the participation rate equation. Nevertheless, the malpractice premium (MPRM) was not significant in either equation. This is not too surprising, since malpractice premiums are a very small component of physicians' costs. Further, the data for this study antedate the sharp increases in premium rates which occurred in the second half of 1975.

The percentage of foreign medical school graduates is positive but not significant in the PPMD equation, and negative and significant in the PART equation. No explanation is apparent for the second result. The quantitative effect of a change in FMG is quite small for both equations, however. Elasticities evaluated at the means are −0.4 (PART) and 0.2 (PPMD) for a 10 percent increase in the proportion of FMGs.

Both EXP and WAGE have moderate elasticities in the participation equation, −3.2 and −3.5, respectively, for a 10 percent increase above the mean value of each variable. (Neither is significant in the Medicaid patients per participating physician equation.) The sharp growth over the last ten years in the number of medical school graduates entering the stock of practicing physicians should work to offset negative factors affecting Medicaid participation. For example, the proportion of physicians younger than 35 years old nearly doubled between 1972 and 1975, from 14.4 percent of all physicians to 27.5 percent [8,9]. But this trend is a fairly long-term effect which will take a number of years to work itself out. Even with the sharp increase in the number of physicians under the age of 35, average physician age declined by only 1.3 percent, from 46.6 to 46 years old.

This is not true, however, for the increase in physicians' office expenses. According to American Medical Association surveys, solo practice physicians' expenses increased from $22,834 in 1969 to $34,000 in 1974. The compound rate of increase over this period was almost 8 percent per year. Given current inflation expectations, it would appear that physicians' expenses will probably continue to grow at similar or higher rates. With other factors held constant, particularly Medicaid fee levels, this trend will continually erode the willingness of physicians to participate in the Medicaid program.

The last proxy variable for physicians' office expenses is SIZE (county population). It is significant at the 1 percent level in both equations, but it has a positive rather than a negative sign as predicted for the PPMD equation. This may reflect the fact that some practices in large areas specialize in Medicaid patients. Even though the expected negative sign is obtained in the PART equation, it is not possible to draw any quantitative inferences for the influence of nonlabor office expenses on Medicaid participation.

The number of nonfederal, office-based physicians per thousand Medicaid eligibles in the county (MDSPE) is negative and statistically significant in both equations. This indicates that either an increase in the number of Medicaid-eligible persons or a decrease in the supply of office-based physicians would increase both the participation rate and the average Medicaid case load.

The last three variables in the two equations are dummy variables for the years 1973, 1974, and 1975. With other factors constant, it appears that both the participation rate and the average Medicaid case load increased in 1974 and 1975 relative to 1972. (1973 showed very little difference.) This pattern may reflect California's introduction of two somewhat controversial Medicaid (Medi-Cal) experiments in 1971. One of these programs imposed copayments on certain Medicaid patients and the other required physicians to obtain prior authorization before providing certain services to Medicaid patients. Although both experiments were in effect throughout the observation period, the year dummies may be picking up initial reactions to the two programs; these may then have been followed by a gradual movement back to Medicaid output levels from the years preceding the experiments. A precise explanation of the coefficient values of the year dummies is, of course, not possible without more detailed information about program and other institutional factors which may have changed from year to year.

Summary and Conclusions

This investigation of the supply of office-based physicians' services to the Medicaid program was prompted by public concern over maintaining what is perhaps Medicaid's fundamental goal—assuring the availability of mainstream medical care for the poor without inflating program or total system expenditures to unacceptable levels. Although many factors are likely to influence physicians' decisions to participate in the Medicaid program, the focus of this study has been on the role of financial incentives, specifically Medicaid reimbursement levels and the revenues physicians could receive by treating other patients. Since Medicaid generally pays physicians some fraction of what they normally receive for any particular service, the structure of the program creates an incentive to prefer full-paying patients to Medicaid patients.

Using the county as the unit of

analysis, we focused our empirical analysis on the experiences of a sample of 3,124 California general practitioners, general surgeons, and internists. All the physicians we studied are solo, office-based practitioners. Information on the number of Medicaid patients treated and on Medicaid and private revenues was constructed from Medicaid and joint Medicaid-Medicare claims paid to the sample physicians by California Blue Shield, the Medicaid carrier in California. This data source permits a more complete and accurate construction of the relevant variables than has been possible for others who studied Medicaid participation.

The most significant finding is the reaffirmation of the importance of the amounts of both private charges and Medicaid payments in determining participation rates and average Medicaid case loads per participating physician.[18] Both variables are, as expected, inversely related to physicians' average billed revenue per patient and are positively related to average Medicaid payments per patient. In addition, it appears that the long-run impact of a change in billed revenue is significantly larger in absolute value than a corresponding change in the amount Medicaid is willing to pay.

If these relationships are typical of most Medicaid programs, then several policy implications follow. First, if the program continues to pay less than the amount physicians charge, it makes it difficult for Medicaid-eligible persons to obtain care from office-based physicians. To the extent that the gap between charges and Medicaid payments grows–and this appears highly likely, given state and local concern over government spending—physicians will become progressively less willing to treat Medicaid patients. One consequence of this trend may be the growth of so-called "Medicaid mills:" medical practices of low cost, high volume, and low quality.

Raising Medicaid payments will make physicians' services more readily available to the poor, but at increased cost. Furthermore, the underlying theoretical evidence as well as the empirical evidence [11,12] suggests that raising the price floor created by Medicaid (or Medicare) stimulates increases in physicians' charges. Initial gains in access would thereby be eroded by subsequent increases in physicians' billed charges.

The essence of the dilemma we infer from these observations is that Medicaid has two objectives, improving access and containing costs, but essentially only one policy instrument, Medicaid fees. An obvious candidate for a needed second policy is the imposition of constraints on physicians' charges. In another study of physicians' Medicaid supply behavior in California, it was suggested that the Economic Stabilization Program (ESP), which constrained physicians' fees between 1971 and 1974 but did not affect Medicaid fees, may have induced an increase in physicians' Medicaid output over what it would have been otherwise [12].

The ESP experience raises the image of an unwieldy and ineffective price control bureaucracy. Nevertheless, the experience of several other western industrialized countries, and of Canada in particular is that a system of fixed fees, uniformly applied to all patients, can be successfully established and administered, can treat both physicians and patients equitably, and can provide government with a major tool for controlling medical care expenditures [13].

Neither physicians nor patients have many incentives to control costs under the present system. Public programs, primarily Medicaid and Medicare, can limit expenditures by holding down

program payments. These gains come at the substantial cost of reducing access to care or shifting the financial burden back onto the poor and the elderly. More basic changes are needed to alleviate the cost-access dilemma.

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END NOTES

[1] Sloan and Steinwald [3] used a dichotomous dependent variable for participation in Blue Shield service benefits program with an areawide estimate of the Blue Shield hospital visit fee. Sloan, Cromwell, and Mitchell [2] defined their dependent variable as the proportion of Medicaid visits in a physician's practice (with a large cluster at zero for nonparticipation). The price variables were state or area estimates of the Medicaid and Blue Shield hospital visit fees. Held, Manheim, and Wooldridge [4] investigated the proportion of physicians' patients who were covered by Medicaid. Prices were defined as the area average price for a routine office visit and the area maximum Medicaid fee for a routine office visit.

[2] The actual size of the fixed fee market is, of course, limited by the number of potential patients eligible for the fixed fee program. In the case of Medicaid, the patient availability constraint is not binding for most physicians [2]. Nevertheless, 23 percent of physicians responding to the survey said that nonavailability of patients was either a "somewhat important" or a "very important" reason for not participating in Medicaid.

[3] See, for example, Lee and Hadley [9], Sloan and Steinwald [3], or Sloan, Cromwell, and Mitchell [2] for more complete specifications of the theory.

[4] The sample was limited in this way for two reasons. First, the claims records do not permit identification of individual physician's billings within a group. Second, a change in a physician's practice location would probably disrupt his or her billings for a period, and thus introduce additional noise into the data.

[5] Claims submitted to Medicare as well as Medicaid were used to circulate the average billed charge for each procedure.

[6] Claims for patients who are also eligible for Medicare must be paid according to Medicare's fee system; they were therefore excluded from computations of the Medicaid average fee paid.

[7] This choice is based on recent evidence which reported a highly skewed distribution for the percentage of office visits devoted to Medicaid patients, with the mode of the distribution occurring at 1 to 10 percent [2]. Using AMA data on the number of total visits per week by specialty, 1 percent would be about 12 to 18 visits per quarter [8]. Since we are counting patients rather than visits, 10 patients per quarter is a reasonable lower bound for the definition of Medicaid participation. A definition of 60 Medicaid patients per quarter, or roughly one Medicaid patient per working day, was also explored. Under this definition, however, the great majority of physicians were classed as nonparticipants making meaningful analysis impossible.

[8]The underlying claims data included over 200 separate procedures. Most physicians typically provide only a small number of different procedures; therefore, procedures were first grouped by major type (medicine, surgery, pathology, and radiology) and then converted to the total number of California Relative Value Scale (CRVS) units per Medicaid patient for each procedure group. Physicians' billed charges and Medicaid fees for each specialty, county, and time period were defined as dollars per CRVS unit for each procedure group. The resultant product of the two vectors is measured in dollars per Medicaid patient.

[9]It is implicitly assumed that the physicians' collection ratio for non-Medicaid bills remains constant over the period of observation.

[10]According to the Internal Revenue Service, payroll expenses represent about 70 percent of the practice costs of sole proprietor physician offices in California in 1973. (Internal Revenue Service, "Statistics of Income 1973, Business Income Tax Returns, Sole Proprietorships and Partnerships.")

[11]As noted in end note 2, some physicians claim that patient nonavailability is an important reason for their not participating in Medicaid. It should also be noted that the effects of physician density (physicians per capita) in a county on the private elasticity of demand are captured in a first-stage regression of billed charge against a number of exogenous demand and cost shift variables. See end note 12.

[12]Variables included in the first-stage regression were average Medicaid and Medicare revenues per patient, average physician experience, percentage foreign medical school graduates, percentage population 65 and older, income per capita, average salary of physician' office employees, average quarterly malpractice insurance premium, average physician experience, experience squared, outpatient visits per capita, hospital beds per capita, unemployment rate, percentage government employment, percentage union membership, percentage Spanish population, percentage black population, percentage Medicaid-eligible persons, physicians per capita, total population, and year dummies for 1973, 1974, and 1975. All variables are defined for the county.

[13]One county had no general surgeons in the sample and was deleted from the analysis.

[14]As reported below, the participation equation includes a price-specialty interaction variable for general surgeons, and the Medicaid patients per participating physician equation includes a similar variable for internists. Thus, two variables are affected by imposing the null hypothesis. At the 5 percent level of significance, values of $F>3.05$ imply rejection of the null hypothesis.

[15]The finding that Medicaid revenue per patient has a much smaller effect than billed revenue per patient on the number of Medicaid patients is consistent with findings derived from microestimates of participating physicians' Medicaid supply functions, with output measured as the total number of California Relative Value Scale units provided to Medicaid patients [9].

[16]Letting μ_{jk} be the error term for the jth county and kth specialty in equation (4′), it was assumed that

$$\mu_{jk} \sim N(0,\sigma_{jk}^2),$$

$$\mu_{jk} = \epsilon_{jk}/\lambda_{jk}^{1/2}, \text{ and}$$

$$\epsilon_{jk} \sim N(0,\sigma^2),$$

where λ_{jk} is the number of sample physicians in the jth county and kth specialty. Equations estimated under the assumption that the variance is inversely related to county population produced very similar coefficient estimates.

[17]Specifications which permitted separate coefficients for both internists and general surgeons in the two equations resulted in implausible values for general practitioners. The hypothesis that there are no specialty differences was rejected for both equations [F=5.16 (PART) and F=14.45 (PPMD)].

[18]This result is consistent with qualitative findings of two other Medicaid participation studies [2,4]. Comparison of coefficient values is not appropriate, however, because of major differences in variable definitions.

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