An Economic Model of Large Medicaid Practices

Jerry Cromwell and Janet B. Mitchell

Public attention given to Medicaid "mills" prompted this more general investigation of the origins of large Medicaid practices. A dual market demand model is proposed showing how Medicaid competes with private insurers for scarce physician time. Various program parameters—fee schedules, coverage, collection costs—are analyzed along with physician preferences, specialties, and other supply-side characteristics. Maximum likelihood techniques are used to test the model. The principal finding is that in raising Medicaid fees, as many physicians opt into the program as expand their Medicaid caseloads to exceptional levels, leaving the maldistribution of patients unaffected while notably improving access. Still, the fact that Medicaid fees are lower than those of private insurers does lead to reduced access to more qualified practitioners. Where anti-Medicaid sentiment is stronger, access is also reduced and large Medicaid practices more likely to flourish.

One of the major goals of the Medicaid program was to integrate the poor into mainstream medicine. To this end, an insurance scheme was devised that allowed Medicaid eligibles the discretion to choose among hospitals, physicians, and other providers. Provider participation—particularly among physicians—was strictly voluntary so long as they were willing to accept the Medicaid-allowed charge as payment in full.

Whether the program has been a success, therefore, depends in no small way on how physicians have responded to the fee schedules and to the accompanying rules and regulations regarding payment. Distressing in this regard is the anecdotal evidence of serious fraud and abuse of the system by physicians, especially in practices concentrating

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Jerry Cromwell, Ph.D. is President of Health Economics Research, Inc., 824 Boylston Street, Chestnut Hill, MA 02167. Janet B. Mitchell, Ph.D. is affiliated with Health Economics Research, Inc. Address communications and requests for reprints to Dr. Cromwell at the above address.

on the Medicaid population [1]. While large Medicaid practices (LMPs) are not necessarily "mills," the maldistribution of Medicaid patients is a legitimate concern. If the majority of the poor are being relegated to a few physicians, both their access to office-based care and the quality of care they receive may be jeopardized. For example, several studies have shown that physicians with large Medicaid caseloads are older, in general practice, lacking in hospital affiliation, and trained abroad [2–6].

Because LMP physicians generally are less credentialled, serious consideration must be given to changes in program policy that might exacerbate the distribution problem even further. Several studies have already shown that physicians are more likely to participate in Medicaid when fees are higher [7–11], but that participants also expand their Medicaid caseloads when enticed by higher fees, leaving unclear the ultimate impact of fees on maldistribution. Sloan, Mitchell, and Cromwell [12], for example, found positive, statistically significant effects of Medicaid fees on physician participation, defined either as a dichotomous decision to accept Medicaid patients or to expand on existing Medicaid caseloads. Policymakers have voiced concern over raising fees for fear that Medicaid mills will reap most of the benefit [13]. Whether these fears are well founded or not remains an empirical question to be addressed in this article.

Also of concern is program scope and patient maldistribution. In states with large numbers of Medicaid eligibles relative to office-based physicians, will the maldistribution problem be more acute, or will more physicians choose to participate and keep LMP growth within bounds?

Answers to these and other questions require a theory of physician participation in Medicaid that simultaneously deals with non-, small, and large participants. It is not enough to consider solely the decision to participate; the physician's decision to expand his Medicaid practice also requires study. The next section examines an economic theory of the size distribution of Medicaid practices, taking into consideration: (1) competition from private markets and other physicians, (2) eligibility limits, (3) discrimination, and (4) factors affecting physician supply. This is followed by a brief discussion of data sources. An empirical test of the model is then made, focusing not on the participation decision per se (which has been investigated elsewhere), but rather on the probability of observing a large Medicaid practice among participants. The last section discusses the findings from both a behavioral and a policy perspective.

THEORY

The origins of large Medicaid practices can be considered in terms of a two-market demand model.[1] In one market, the physician sets prices, demand is downward sloping, and additional visits are demanded only at lower prices. In the second market, fees are predetermined and the physician serving this market can provide as much as he chooses, within limits, at a fixed price. While several insurers have fixed payment schedules, we consider only the fixed-payment Medicaid program here.

Assuming profit maximization (to be relaxed momentarily) for each visit level, the physician moves down along his marginal revenue curve, AB, in Figure 1, until marginal revenue falls below the fixed Medicaid fee, f_m.[2] The physician then begins to participate in the Medicaid program until the pool of Medicaid patients is exhausted.[3] Demand segment, BC, corresponds to the potential pool of Medicaid patients upon which each physician may draw. The introduction of Medicaid effectively segments marginal revenue into two parts—one above, one below—the Medicaid fee, f_m. Marginal patients in the upper segment, AB, are willing and able to pay higher fees than f_m, while in segment CD, they will only pay less than f_m.

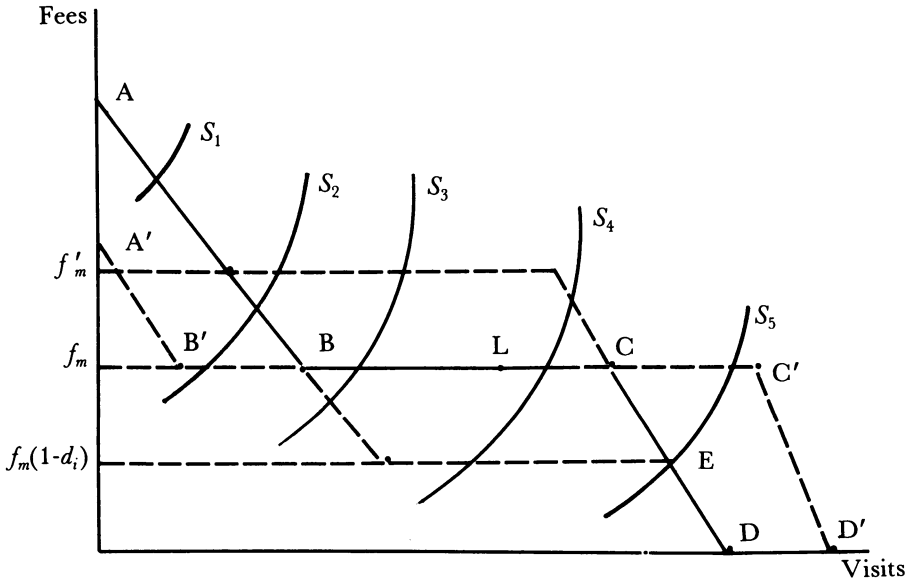

Figure 1: Medicaid Participation Model

If a physician's supply curve is S_3 he can be said to be operating a small Medicaid practice (SMP), as the majority of his visits are with private patients. (A more precise definition of an SMP will be given later.) If physician supply is farther to the right, say S_4, then this practice can be considered an LMP, as a majority of patient visits are devoted to Medicaid patients. If supply is far to the left, say S_1, then the physician is not accepting any Medicaid patients.

Thus, the physician's decision to participate in Medicaid, as well as the level of his participation, depends on supply and private-plus-Medicaid demand. Private physician demand can be considered a function of patient health status, income, and insurance, plus the physician's credentials and his/her competition. Considerable empirical research has documented the effects of health status, income, and insurance on private demand [14,15]. Patients should also be willing to pay higher fees to see better-trained specialists [10,12]. Holding these factors constant, private demand per physician should be lower in physician-rich areas because of competition, with limited numbers of patients spread among a larger number of physicians.[4] Factors limiting private demand shift marginal revenue inward (see $A'B'$, in Figure 1), increasing the Medicaid participation rate for a given physician, *ceteris paribus*. Reduced demand also draws into the program marginal non-participants (represented by supply S_2).

MEDICAID COVERAGE AND GENEROSITY

Medicaid coverage and generosity of payment definitely affects the level and nature of physician participation. Consider first an increase in Medicaid fees from f_m to f'_m without a change in program eligibility. If physician supply is S_2, an increase in fees to f'_m will draw the physician into the Medicaid market as an SMP. If supply is S_3, the effect of a Medicaid fee increase may be to turn an SMP into an LMP. Note that while total visits have increased with higher Medicaid fees, private visits have generally decreased, implying some substitution at the margin of poorer Medicaid for wealthier (or previously better insured) patients. Physicians with supply S_1 and S_5 are unaffected by the fee increase—the former still not seeing any Medicaid patients and the latter seeing all who ask for an appointment.

The net effect of Medicaid fees on the probability distribution of SMPs and LMPs in an area is generally ambiguous. Higher Medicaid fees do not necessarily foster LMPs (at least as a percentage of participants) if significant numbers of new physicians (like S_2) enter the Medicaid market as SMPs.

An increase in program eligibility or scope of benefits should have different effects. Increasing the Medicaid-eligible pool per physician has the effect of "lengthening" the Medicaid line from BC to BC′. This should have no effect on nonparticipating physicians: Medicaid fees have not increased, so marginal revenues from private patients still exceed the Medicaid fee.[5] Nor does it have any effect on participating practices that have not exhausted their potential pool of eligibles, again for the same reasons. Some practices, however, may be seeing all of the Medicaid patients who apply and some non-Medicaid poor in addition, e.g., S_5. An extension of Medicaid coverage will have a positive effect on participation (as well as on total visits) as these physicians substitute better-paying Medicaid for poorer-paying private patients. If Medicaid-extended coverage is for the poor who are already part of the physician's caseload—say, CE—then no substantial improvement in access will obtain (unless S_5 is quite elastic)—only a reduced out-of-pocket burden for the new eligibles. If coverage is extended to patients in segment ED, however, then the near-poor comprising CE will suffer as a result of expanded Medicaid coverage to the very poor.

A practice characterized by S_5 highlights an interesting point. A physician may be seeing all of the Medicaid patients that apply, but because the eligible population is so limited (at least before the program expanded), his practice may still be an SMP. Furthermore, the length of the horizontal line, which is based on the Medicaid population, is clearly related to private demand factors such as income. For this reason, we would expect both participation rates and the number of LMPs to be higher in poorer neighborhoods, inner cities, and rural areas. This may be offset, on the other hand, by a shortage of physicians in these areas, which would shift out *pro rata* private demand and reduce Medicaid participation. Thus, we have the rather surprising conclusion that, depending on the geographical match between physicians and patients, the number of *both* nonparticipants and LMPs in a low-income, high-Medicaid area may be higher than elsewhere if physicians are particularly scarce—as they generally are in these areas. Physicians, knowing the inner-city poor have access to outpatient facilities, also may restrict their practices to non-Medicaid patients.

Summarizing on the demand side, theory predicts that any factor raising (lowering) private demand per physician (e.g., patient income, insurance, health status; physician credentials and specialization; the physician-population ratio) should decrease (increase) the probability of participation as an SMP and of the participating practice expanding to an LMP, *ceteris paribus*. Similar predictions obtain for an increase in Medicaid fees. Whether higher Medicaid fees would exacerbate the

distribution of patients between SMPs and LMPs becomes strictly an empirical question. Extensions in program eligibility, by contrast, should have definite effects on the size distribution of Medicaid practices, essentially skewing the distribution toward more LMPs.

DISCRIMINATION

The analysis so far has implicitly assumed that physicians do not discriminate among patients on factors other than ability to pay. Some physicians, however, may have a distaste for Medicaid patients or for the program as a whole. Some of their reasons may be objective (e.g., fee schedules too low, long payment delays, too much red tape, few Medicaid eligibles), others more personal. In a 1976 physician survey, nearly 40 percent of nonparticipants cited an "opposition to government in medicine" as a very important reason for not participating in the Medicaid program. Twenty-five percent also cited a "dislike for the kinds of patients enrolled" as a reason for not participating [7, p. 122]. Subjective responses like these suggest strongly that physicians discriminate against Medicaid patients for reasons other than economic.

Faced with a stated Medicaid fee, f_m, some physicians act as if $f_m(1 - d_i)$ is the *net* fee, where d_i reflects the strength of the ith physician's discrimination coefficient in line with Becker [20].[6] This has the effect of lowering the flat Medicaid portion by an amount, $f_m d_i$, which clearly will vary by individual physician, unlike f_m, which all physicians receive as a nominal payment.[7] The effect of discrimination will be to lower participation and physician gross revenues—but not always. For example, it is immaterial whether the physician with supply S_1 discriminates or not, for he would not participate in Medicaid in any event. For physicians with supply S_3 or S_4, however, discrimination does make a difference. The "potential" SMP physician with supply S_3, if he has a positive discrimination coefficient, d_i, will not participate in Medicaid, even though he should on objective financial grounds. The "potential" LMP physician with supply S_4, will only be an SMP, choosing instead to move farther down his private demand curve before (begrudgingly) entering the program.

Discrimination in this context costs the physician because he chooses to see poorer-paying private patients at the margin rather than better-paying Medicaid patients. Economic losses to physicians naturally increase with d_i.[8] In the extreme where $d_i > 1$, the physician limits himself strictly to non-Medicaid patients whatever his objective supply. For these physicians the economic loss may be a high price to pay for refusing to accept Medicaid patients, particularly if private demand is limited. This does not necessarily mean that the physician is

not seeing poor patients—on the contrary, he may be seeing many of the poor. He simply is not receiving directly from them as much as he could be if he had chosen to accept them as Medicaid patients.

The size distribution of Medicaid practices will vary depending on the mean and variation in d_i. Holding other factors like private demand and the distribution of practices constant, an inverse correlation between discriminatory preferences and supply (i.e., smaller suppliers with a greater distaste for the Medicaid program) should result in greater inequalities in Medicaid practice size. In this case, there should be more nonparticipants and fewer SMPs, leaving the bulk of the Medicaid population to be served by a few LMPs. Like Medicaid fees, a greater average level of discrimination in an area has an ambiguous effect on SMP/LMP inequalities. A positive correlation between discriminatory preferences and private demand will encourage LMPs, because discriminators tend to enjoy more lucrative private practices, leaving the nondiscriminators—who lack wealthy private patients—to treat the Medicaid population.

VARIATIONS IN PHYSICIAN SUPPLY

The ultimate impact of any shift in private or Medicaid demand on Medicaid participation rates in an area will depend on the locus and distribution of physician supply. Nationwide, Medicaid patients constitute 10–15 percent of all private physician caseloads [3]. If Medicaid patients and physicians were distributed equally across the general population, then participation rates would approximate 10–15 percent in any community. Because neither Medicaid recipients nor physicians are very equally distributed, however, it is possible for nearly all physicians in an area to be operating LMPs if few non-Medicaid patients exist. They do not have to be; need may simply be going unmet as particular physicians choose to see a limited number of patients *in toto*.

If the distribution of supply curves is uniformly distributed along the entire "visits" axis, as shown (roughly) in Figure 1, then a complete mix of nonparticipants, SMPs, and LMPs obtains. Shifts in demand will alter the mix, with increases in private demand (or reductions in Medicaid fees) resulting in more nonparticipants, fewer LMPs, and more or fewer SMPs, depending upon the distribution of practices around the "drop-out" kink (B) and some designated point L, the point where an SMP becomes an LMP.[9] If practices are more closely bunched around B than L, then increases in private demand or Medicaid fee reductions should reduce the relative number of SMPs to LMPs and exacerbate inequalities in the distribution of Medicaid patients across physicians.

The locus and distribution of area supply will depend on the mean of, and the variance in, the characteristics that underlie individual physician supply: (1) input prices, (2) productivity, (3) physician preferences for income and leisure, and (4) practice style. In areas where auxiliary wages are high, or where average productivity is low, total physician supply will be lower because physicians are financially limited in the visits they can provide profitably for a given fee. Specialists, for example, see fewer patients per hour. Therefore, in specialist-dominated areas, we would expect more limited supply and lower participation rates, *ceteris paribus*. If physicians in an area also have a higher average preference for leisure (e.g., older, semiretired physicians in Florida or Arizona), supply will be less than in areas where work (or income) preferences are stronger. Finally, in areas served by physicians whose practice style includes a significant number of high-quality inputs, amenities, and the like, supply will also be less as fees will cover only a limited number of more costly visits before marginal costs exceed marginal revenues.

Variations in physician supply are a function of variations in the same four categories. Presumably, all practices in an area face the same non-physician input prices, although certain exceptions may exist (e.g., black physicians may have to pay higher wages to attract white registered nurses in urban ghettos); thus, within-area variations in factor prices should not be a major contributor to supply differences or to the number of LMPs, although they may explain more of the *inter-area* variation.

Variations in physician productivity are considerable, however, as Reinhardt [24] has shown. Much of this variation tends to be specialty specific.[10] Any remaining output variation depends largely on the physician's managerial capacities and inclinations.

Physicians also vary considerably in the imputed wage they apply to their own efforts or, alternatively, their preferences for leisure. In addition to random variations in income-leisure preferences, physicians with significant nonpractice income or who are elderly—or female physicians who have children to raise—should have a greater disutility for work, *ceteris paribus* [12,25,26].

Finally, the most important variation from a policy perspective is physicians' choice of practice style, which is partly due to training and specialty choice, partly due to a desire to increase income. Variations in practice style include the time physicians spend with patients, the ancillaries they order, the quantity and quality of labor inputs used, the size of waiting rooms, and the like.

Consider first the use of ancillaries. Because these services are

usually billed separately, it is appropriate to consider ancillaries a second output of the physician's practice, complementing direct patient contacts. Physicians may or may not internalize ancillary services.[11] If they do not, no financial benefit derives from ordering tests and procedures unless illicit kickbacks are being paid. Where physicians do produce ancillaries in their offices, they have a direct financial interest in the allowed charges of third-party payers and in production costs. For each visit, such physicians receive two fees, one for the visit itself and a second for any ancillaries, resulting in the total visit price. The effect of internalizing ancillaries is to shift final visit demand outward, resulting in provision of more private visits (assuming positively sloped supply curves). The marginal physician who internalizes ancillaries has less need or desire to enter the Medicaid market, since marginal revenues per private visit are higher. Physicians with very strong income preferences, however, may feel freer to order additional tests for their Medicaid patients who incur no out-of-pocket cost, a behavior typifying Medicaid mills [28] but not large Medicaid practices in general [29]. For these physicians, the decision to internalize ancillaries and to see large numbers of Medicaid patients is jointly determined.

Other differences in practice style—e.g., time spent with patients, use of support personnel, and amenities—can be characterized as supply shifts. Physicians who see patients on an assembly-line basis and who skimp on auxiliary personnel can certainly see more patients per hour at lower incurred costs. The higher net incomes enjoyed, however, come primarily at the patients' expense and are not condoned by the majority of medical professionals. It is difficult in practice, however, to distinguish between the true quality minimizer and the simply more efficient practitioner.

DATA SOURCES

The primary data base for this analysis is the 1977 physician survey conducted by the National Opinion Research Center (NORC) for the Health Care Financing Administration (HCFA). This survey was a nationally representative sample of 3,482 physicians in 15 specialties. The sample was then reduced to 1,796 physicians in the 5 primary care specialties: general and family practitioners, general surgeons, obstetrician-gynecologists, pediatricians, and internists. All physicians were in private practice, and the vast majority were office based (95.8 percent). Physicians in group practices with ten or more physicians

were excluded. All empirical work is based on the individual physician as the unit of analysis, with a prorating of group data where necessary.

An extensive questionnaire was administered to all physicians, primarily by telephone, covering practice costs, work effort, size and type of practice, physician income, and fees. All information was based on physician self-reports. The size distribution of Medicaid practices was calculated from the individual physician's response to the following question: "About what percentage of your patients have Medicaid?"[12]

Measurement error may be present if physicians refused to participate in the survey, or if they reported inaccurate or incomplete information during the interview. Because the dependent variable is dichotomous, less error should exist than if continuous participation rates were used. Analysis of the 1976 physician survey found that nonrespondent physicians did not differ from cooperating physicians along characteristics believed to be associated with large Medicaid practices, such as specialty, board certification, and FMG status [7]. Weights associated with the 1977 sample include adjustments for nonresponse. A downward bias in the number of LMPs undoubtedly remains, as true physician "mills" are likely to have refused the interview. How much this affected the results is unknown.

Three additional data sources were merged with the physician survey for this analysis. Biographical information on individual survey physicians was obtained from the *AMA Masterfile*, including such data as physician age, board certification, and medical school. Variables describing the physician's county, such as demographic characteristics, were drawn from the Area Resource File. Two community variables, per capita income and physician-population ratios, were obtained from a more current source: the American Medical Association's *Physician Distribution and Medical Licensure in the U.S., 1976.*

EMPIRICAL SPECIFICATION

DEPENDENT VARIABLE

The dependent variable is specified as a dichotomous variable in which "one" signifies that the physician runs a large Medicaid practice, and "zero," a small Medicaid practice. Since the purpose of this analysis was to distinguish solely between large and small Medicaid practices, nonparticipants were omitted. (See [7,12] for a continuous participation *rate* analysis.) This alters, in definite ways, the prediction and interpretation of causal variables. For example, outward shifts in private

demand should unequivocally reduce the percentage of LMPs in the *total* practice population (including nonparticipants). Whether such a shift has the same effect on the *mix* of SMPs and LMPs, however, is generally ambiguous, because nonparticipants have been dropped in the calculation of LMP probabilities and nonparticipation is correlated with income. High-income areas should have fewer LMPs; they may not have fewer SMPs. The ultimate effect on mix will depend on the distribution of practices around the drop-out kink and the arbitrary definition of an LMP.

To test the sensitivity of parameter estimates to the definition of an LMP, the dependent variable assumes two variants: (1) LMPs are defined as practices with 30 percent or more Medicaid patients (*LMP30*), and (2) LMPs are restricted to those practices with at least one-half of their patients on Medicaid (*LMP50* or *ELMP*). These cutoffs roughly correspond to one and two standard deviations above the mean participation rate of 13.3 percent, respectively. Nonparticipants were 22 percent of the primary care sample, while *LMP30* and *LMP50* constituted 20 and 6 percent of participants, respectively.

INDEPENDENT VARIABLES[13]

Fee Schedules. Two variables were included to measure the influence of relative fee schedules on the physician's decision to run a large Medicaid practice: the Medicaid fee for a routine office visit (*MCDFEE*) and Blue Shield's allowed fee for the same procedure (*BSFEE*). Both variables are defined for the physician's state or plan area. The Blue Shield fee was used as a measure of the relative generosity of private third-party payers, although coverage is rather limited for office care. Fees, as well as all other monetary variables, were adjusted for area cost-of-living differences. Without knowing precisely the distribution of supply in an area, it is impossible to predict *a priori* the effects of raising Medicaid fees on the probability of observing an LMP.

Physician Credentials. Physician credentials include specialty, board certification in a specialty, and FMG status. Specialists have undergone more years of professional training than have general practitioners and thus are less likely to accept large numbers of low-marginal-revenue Medicaid patients. The dummy variables, *GS, IM, OB,* and *PED*, represent general surgeons, internists, obstetrician-gynecologists, and pediatricians, respectively. General practitioners represent the omitted category.

Because board-certified physicians and U.S. medical graduates both are generally considered to have higher technical expertise, they enjoy a greater demand for their services. As a result, they are hypothesized to be less likely to run large Medicaid practices. *BOARD* and *FMG* each assume the value *one* if the physician is board certified, or if he is a Third-World foreign medical graduate, respectively. A Third-World FMG is defined as a graduate of a medical school in a non-English speaking, non-Western European country. (An exception is made for graduates of Mexican medical schools, many of whom are U.S. citizens who studied there. Presumably, they will experience less difficulty in building a practice and obtaining referrals than noncitizens.)

Physician Age. The older physician is likely to face a drop in demand for his services in the fee-setting market, as patients and referring physicians increasingly opt for younger physicians more fully acquainted with the latest medical techniques. If so, he may begin to supply more services in the price-taking (Medicaid) market, and be more likely to run a large Medicaid practice. Conversely, if older physicians wish to reduce their workloads, they may drop low-marginal revenue patients first. Competition versus the work effort effects of age must be tested empirically. Physician age is specified as a dummy variable (*MDAGE*) which assumes the value *one* if the physician is 60 years of age or older. This provides a sharper test of the age hypothesis than a continuous specification.

Community Demand. The demand for physician visits is influenced, *inter alia*, by the ability to pay of the patient population in the physician's county. Two variables measure ability to pay: per capita income (*Y*) of private patients and Medicaid coverage (*MCAID*) for poor patients in the county. *MCAID* measures Medicaid recipients as a percentage of county population, based on the distribution of state poor.[14]

As the physician-population ratio rises, demand per physician falls in the fee-setting market, encouraging higher levels of Medicaid participation. Like fees, income, and other variables that affect private demand, physician density is ambiguously related to the probability of observing a large Medicaid practice. *MDPOP* is defined as the number of office-based patient-care physicians per 1,000 county population.

Practice Costs. When wage rates rise for nonphysician personnel, it is less likely that the Medicaid-allowed fee will provide sufficient mar-

ginal revenue to cover increased practice costs. High wage rates should discourage Medicaid participation—though possibly more for the marginal participant. The variable *WAGE* is a county index of wage rates of nonphysician personnel.

Geographic Regions. Regional effects, including variations in supply characteristics, Medicaid program generosity, charity, and discrimination, are proxied by geographic location. *NEAST, SOUTH,* and *WEST* represent the Northeast, South, and West census regions, respectively. The North Central region constitutes the omitted category. *Ceteris paribus*, LMPs should be more prevalent in the South because of higher physician nonparticipation in public benefit programs generally (possibly due to discrimination or conservative political attitudes).[15]

ESTIMATION METHODS

With a qualitative, zero-one, dependent variable (SMP = 0, LMP = 1), ordinary least-squares methods are inefficient because of the concentration of values at two extremes [30]. Multivariate probit analysis is preferred because it constrains the predicted values of the dependent variable to the unit (0,1) interval. In the probit model, the conditional expectation is given by:

$$E\left[\, y_i \mid \hat{I}_i \,\right] = prob\left[\, y_i = 1 \mid \hat{I}_i \,\right] = F(\hat{I}_i)$$

where $F(\hat{I}_i)$ = ordinate of the cumulative normal distribution, which forms an *S*-shaped curve in the unit interval.

The predicted probit index, $\hat{I}_i$, is calculated by multiplying the estimated maximum likelihood coefficients times the appropriate values of the independent variables. The conditional probability of the practice being an LMP (i.e., $prob[Y_i = 1]$) can then be determined by looking up values of $\hat{I}_i$ in a cumulative normal distribution table.

Interpretation of probit results, therefore, is a two-step process, unlike OLS estimates, which have direct implications (e.g., the coefficient of income in a consumption function is the marginal propensity to consume). Estimates must first be converted using the cumulative normal distribution before impacts on conditional probabilities (or elasticities) can be determined. Signs of coefficients and statistical significance do give the *direction* of effects on probabilities, however.

FINDINGS

Two probit regression equations along with the means for the dependent and all explanatory variables are displayed in Table 1. Because the probit coefficients are not directly interpretable, a set of marginal impacts of selected, statistically significant variables is provided in Table 2. Elasticities are calculated for continuous variables from the expectational formula given above, while marginal effects of 0,1 differences are given for the discrete, dummy variables. For example, a 1 percent increase in the size of the Medicaid pool (*MCAID*) results in a 0.49 percent increase in the probability that the practice is 30 percent Medicaid rather than an SMP. Marginal effects simply give the absolute change in the probability of observing an LMP associated with positive values of the discrete independent variables. Thus, being board certified reduces the probability that a practice is an LMP by 8.6 percentage points (around a mean of 20 percent).

Table 1: Regression Results for Large Versus Small Medicaid Practices

	*Probit Maximum Likelihood Estimates**		
Variables	*LMP30*	*LMP50*	*Means*
LMP30	–	–	0.20
LMP50	–	–	0.06
MCDFEE	-0.88	1.40	8.49
BSFEE	-3.01†	-0.08	12.24
IM	33.20‖	-50.54‖	0.22
GS	11.54	-50.62‖	0.21
OB	18.10	-49.01‡	0.09
PED	24.71†	-12.30	0.08
BOARD	-44.24‖	-68.79	0.40
FMG	31.20‡	-147.02‖	0.60
MDAGE	8.79	25.81‡	0.30
Y	-0.02‡	-0.00	5,285.70
MCAID	579.98‖	399.75	0.05
MDPOP	24.19‡	43.83‖	1.09
WAGE	1.41	3.01	4.61
NEAST	2.47	77.11‖	0.28
SOUTH	36.87‖	39.64‡	0.27
WEST	65.50‖	3.00	0.22
CONSTANT	-53.21	-240.83‖	

*Coefficients are multiplied by 100.
†Significant at 10 percent level.
‡Significant at 5 percent level.
‖ Significant at 1 percent level.

The fee schedule variables are generally insignificant.[16] Evidently, the incentive to expand Medicaid caseloads with more generous fees is offset by the entrance of previous nonparticipants (see [12] for direct evidence on the 0,1 participation decision), leaving the mix of SMPs and LMPs unaffected. Higher Blue Shield fees, reflecting an outward shift in private demand, reduces the likelihood of observing an LMP among participants, but only for the 30 percent cutoff point.[17]

Variations in public and private demand have the expected impacts on physician participation levels. In higher-income areas, physicians supply more private visits and thus maintain smaller Medicaid practices. When public demand is high, on the other hand, as measured by a large Medicaid-eligible pool, physicians are willing to supply more Medicaid visits and operate larger Medicaid practices. Neither of these variables (*Y* and *MCAID*) are significant when the "extra-large" definition of LMP is used, suggesting that these demand variations are more important predictors at lower Medicaid participation levels.[18] A large Medicaid program, in other words, will encourage LMPs but mostly in the range of 30–50 percent Medicaid.

The probability that a physician will run a large Medicaid practice is greatly increased in physician-dense areas, however, as shown by the significant, positive *MDPOP* coefficient in both equations. This is particularly important for policy purposes, for it suggests that already participating physicians will respond to increased competition in the private market by supplying more and more visits to Medicaid patients, offsetting the equalizing effects of new participants.

It was hypothesized that specialists face a higher private demand for their services than do general practitioners, and hence are less likely to operate LMPs of whatever size. Yet the specialty parameter estimates appear to be highly sensitive to the definition of LMP used. When defined as practices with 30 percent or more Medicaid patients, the four specialties are *more* likely to run LMPs, internists and pediatricians significantly so. Using a 50 percent cutoff, on the other hand, three specialist groups (internists, general surgeons, and obstetrician-gynecologists) are significantly *less* likely to be found in *ELMP*s. Although specialists can command higher fees for their services, their demand also is more inelastic. Thus, it may be impossible for them to concentrate solely on non-Medicaid patients. Because of their scarce talents, they may also feel morally bound to treat a certain number of sicker Medicaid patients. Hence, we find a surprisingly large percentage of specialists running reasonably large Medicaid practices (between 30 and 50 percent Medicaid). However, we do not find many specialists concentrating exclusively on Medicaid patients either.[19] The

need for their specialized skills is not there, and certainly the low Medicaid fees make serving the market unattractive at the margin.

What kinds of specialists are seeing large numbers of Medicaid patients? Apparently those who are less often board certified. They are also more likely to be FMGs, although this depends on the cutoff used. Why FMGs are significantly less likely to be running an *ELMP* is unknown. Possibly it has to do with the intraregional distribution of FMGs. They may locate in large cities where private demand is significant relative to the Medicaid population. They may be seeing all of the Medicaid patients they can, but this only raises their participation to 30–50 percent. If private demand and the Medicaid population were well measured, this hypothesis could not be maintained, but knowing the error in the proxies used, it is quite possible the FMG dummy contains some residual locational information as well.

The *MDAGE* coefficient is positive in both probit equations, and significant with *LMP50* specification. Older physicians appear more than willing to offset falling private demand with increased supplies of Medicaid visits.

Table 2: Impact of Independent Variables on Large Medicaid Practices

Variable	*LMP30*	*LMP50*
*Elasticities**		
MCDFEE	—‡	—
BSFEE	-0.60	—
Y	-1.65	—
MCAID	0.49	—
MDPOP	0.46	1.10
WAGE	—	—
Marginal Effects†		
IM	7.5	-2.9
GS	—	-2.9
OB	—	-2.5
PED	5.6	—
BOARD	-8.6	-4.6
FMG	7.3	-3.9
MDAGE	—	2.1
NEAST	—	7.9
SOUTH	8.2	3.4
WEST	16.2	—

*Based on a 10 percent increase.
†Measured in percentage points (0–100).
‡Independent variable was insignificant.

The *WAGE* coefficient was not significant in either equation, suggesting that labor costs do not affect the decision to run an LMP. Theory had predicted a negative relationship—i.e., that physicians in high-wage areas would decline to see large numbers of Medicaid patients.

Finally, the regional dummy variables indicate strong geographic variations in LMPs above and beyond those captured by other variables such as *MDPOP* and *MCAID*. Physicians in the South and West are more likely to devote 30 percent or more of their practice to Medicaid patients. Using the 50 percent LMP definition, the probability of running an LMP is higher in both the South and Northeast. To the extent that private demand, the Medicaid pool, and the distribution of physician supply are held constant, geographic region may be a proxy for variations in nonmaximizing behaviors, such as discrimination. Also, dislike for government programs or Medicaid patients may lead to greater inequalities in Medicaid practice size in certain areas, such as the South. In particular, physician nonparticipation rates will be higher, leaving large numbers of Medicaid patients to be served by a smaller number of participating physicians.

DISCUSSION

From a policy perspective, the most important finding of this study is the null impact that higher Medicaid fee schedules have on the expected likelihood of patient treatment in large Medicaid practices. Where Medicaid fees are higher, roughly as many physicians opt into the program as expand their Medicaid caseloads to exceptional levels, leaving unchanged the overall probability that a Medicaid-eligible patient will be treated in an LMP. Absolute access has clearly increased, however, with the emergence of new "Medicaid" physicians.

The average Medicaid fee in our 1977 sample was only 70 percent of Blue Shield's, clearly making Medicaid participation financially unattractive. Simply raising Medicaid fees could be frustrated by insurer competition, however, as Blue Shield and others raise fees in order to maintain good provider access for their beneficiaries. Thus, while it is important to know that higher public fees will not exacerbate the Medicaid access/quality problem even more, program cost considerations may discourage states from being more generous.[20]

Other findings further suggest a less-than-optimistic picture of patient access. First, where the number of Medicaid eligibles is large relative to the number of physicians, many are relegated to LMPs (or hospital clinics and emergency rooms) for care. Also, where physician

competition is greater, Medicaid patients are more maldistributed. If physician participation rates were higher, this presumably would be less of a problem, although local physician shortages would inevitably remain.

Second, not only are patients in large programs more likely to be treated in Medicaid-dominated practices, but these practices are run, more often than not, by an older, non-board-certified general practitioner [3,29].

Finally, definite regional effects may be symptomatic of a conscious or unconscious mismatch between the Medicaid poor and office-based physicians. Higher nonparticipation in the South may reflect a distaste for Medicaid patients, a dislike for government-sponsored programs, or both. Only 13 percent of Southern physicians in another study (versus a mean of 20 percent overall) agreed strongly with the statement that it was society's responsibility to provide health care regardless of ability to pay [32]. But why, then, are very large Medicaid practices much more prevalent in the Northeast as well as the South? A more sophisticated explanation than overt discrimination against Medicaid eligibles would consider the scarcity of office-based physicians in the poorest urban ghettos and rural areas. The few large Medicaid practices that can be considered "mills" are able to exist and prosper, in part, precisely because of a lack of competition from reputable physicians.

The answer, as we have already seen, of course, is not just to increase physician supplies in an area, but rather to entice those already in the area to participate more fully by making the program more attractive. Raising Medicaid fees would definitely help if other insurer payments could somehow be controlled, say, through health maintenance organizations. Even more attractive might be shorter payment delays and less billing confusion, both of which have been found to encourage nonparticipants to enter the program [9,11,12].

NOTES

1. A more nearly complete exposition of the two-market demand model, including a comparative statics analysis of changes in exogenous demand and supply variables, can be found in Sloan, Mitchell, Cromwell [12]. Furthermore, the "physician" and the "practice" are treated synonymously in the text. As most physicians continue to practice alone, distinguishing between the two seems unnecessary. Nor should it make any difference in the theory. All empirical findings regarding group-practice physicians pertain only to the individual physician.

2. For a monopolist facing a downward sloping demand curve, marginal revenue would be below the demand curve. If the physician were a perfect price discriminator, however, marginal revenue and demand curves would coincide. The relevant marginal revenue curve, therefore, will be closer to the demand curve the more the physician price discriminates. While the extent of price discrimination certainly influences how soon a physician will enter the Medicaid market, it does not basically alter the model, only the empirics.
3. While the total Medicaid pool would more than fill the caseload of any individual physician, limited access implies a finite *potential* pool that a physician could realistically serve. This may or may not exhaust the rest of his patient-contact hours.
4. This assumes no demand inducement, or that people living in physician-rich areas differ from residents of other areas in ways which increase their demand for services. If physicians can protect themselves against competition by arbitrarily shifting private demand, then more physicians in an area would not necessarily lead to fewer private visits per physician—and the corollary, more Medicaid visits. Perceived disadvantages to serving Medicaid patients (e.g., payment delays, discrimination) may actually encourage some physicians to induce private demand rather than entering the public market. Recent proinducement literature includes Fuchs [16], and Mitchell and Cromwell [17]. Anti-inducement literature includes Sloan [18] and Lee and Hadley [19].
5. According to the 1975 HCFA physician survey, 77 percent of nonparticipants did not feel that the absence of Medicaid eligibles explained their nonparticipation. Other factors like low fee schedules were emphasized [12, p. 225].
6. While d_i is usually defined in terms of subjective preferences, real physician costs associated with the Medicaid program which lower net returns (e.g., complicated forms, payment delays) are comingled with preferences and are very difficult to disentangle.
7. Actually, all physicians would receive f_m if no specialty or physician-specific differences in allowable fees existed. Medicaid programs do make specialty distinctions. In addition, many use UCR reimbursement techniques based on individual physician profiles [21,22].
8. For a mathematical treatment of losses due to discrimination in the context of employer discrimination, see Thurow [23, p. 115].
9. This point is clearly arbitrary. In the empirical work that follows point L, where an SMP becomes an LMP has been defined as either 30 or 50 percent of visits Medicaid. This percentage was determined based on inspection of the size distribution of Medicaid participation.
10. Within the five primary care specialties in our sample, for example, the number of weekly visits varied from 191 for general practitioners down to 145 for internists and OB-GYNs.
11. For reasons why they might or might not, including such variables as practice size and specialty, see Ernst [27].
12. Data on the actual number of *visits* rendered to Medicaid patients are not available from the 1977 survey. If physicians provided disproportionately more services to their non-Medicaid patients, however, the extent of physician participation in Medicaid programs would be overestimated. A

t-test of means using 1976 data showed no significant differences, however, supporting our use of "patients treated" as an unbiased estimate of Medicaid practice size.

13. Unfortunately, the 1976 survey did not collect data on two important categories of explanatory variables: (1) measures of the administrative costs incurred in collecting from Medicaid; and (2) physicians' political attitudes. Both sets of variables were significant predictors of Medicaid participation in Sloan, Mitchell, and Cromwell [12]. These variables were less powerful in participants-only equations, however, suggesting that they are more important in explaining the decision to participate, rather than the level of participation once the decision is made.
14. No data on Medicaid enrollments are available below the state level, but data on the percentage of population below poverty are available by county from the 1970 U.S. Census. Taking each state's mean poverty proportion as 1.0, we developed a poverty index for counties in that state. This index, multiplied by state estimates of Medicaid patients as a percentage of population, yielded our Medicaid coverage variable (*MCAID*).
15. The Medicaid nonparticipation rate in the South was nearly 28 percent compared to 21.5, 21.4, and 13.4 percent in the North Central, North East, and West regions, respectively.
16. Null findings can always be attributed to measurement error, but the fact that these same fee variables have successfully predicted absolute participation levels elsewhere [10,12] reinforces our confidence in their accuracy—at least in relative terms.
17. The Medicaid and Blue Shield fees were correlated .43, implying significant collinearity, but probably not enough to account for the generally insignificant fee effects.
18. *Y* and *MCAID* were correlated -.37, so collinearity was not as serious as might be expected.
19. Over 60 percent of LMP30 practices are run by general surgeons, internists, and OB-GYNs, but the percentage drops to less than 30 percent when the LMP50 criterion is used. See [29, Table 2].
20. See [31] for a fuller discussion of insurer competition and the drawbacks associated with unilateral fee increases in public programs.

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