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Determinants of Physicians' Fees

I. INTRODUCTION

Of the many physician decisions that have been studied, pricing of specific medical procedures is of particular interest, given the recent inflationary trend in medical care prices and the widely held view that medical care is a "merit want." The national experience with such "demand-shift" medical care programs as Medicare and Medicaid has shown quite clearly the unfortunate consequences of not taking into account the potential price responses to such programs. Moreover, the debate over alternative national health insurance systems, with their varying implications for medical care costs and prices, adds to the current policy importance of an examination of how physicians set their fees.

The present study has two broad objectives. The first is to develop and test hypotheses concerning potential determinants of physicians' fees. The study will not attempt to develop a single theory of physician price setting, but will respond to alternative theories advanced in the literature. Findings of the current analysis will be related to these theories, and likely paths of future efforts to improve upon the theoretical foundation of research on physicians' fees will be suggested.

The second objective is to determine the specific effects of different types of insurance coverage and methods of reimbursing physicians on fees. Past research in this area has most often considered medical insurance solely in terms of extent of coverage. Given increasing levels—but variable types—of insurance coverage and increasing diversity in methods of reimbursing physicians, it seems apparent that a more thorough analysis of the relationship between medical insurance and physicians' fees is warranted.

Data on fees and other attributes of physicians' practices come from a mailed questionnaire survey conducted by the American Medical Association during fall 1971. Mailed questionnaires (with six follow-up mailings) were sent to a sample of U.S. physicians with questions pertaining to the year 1970 and to current periods during 1971. The

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sample is not random, in that only physicians who were indicated by AMA records to be engaged in nongovernmental, patient-care activity (excluding interns and residents) were asked to respond, and physicians in nonsolo practice arrangements are overrepresented. The overall response rate to the survey is 57 percent, resulting in a data base of 5,085 physician records. Fee data relate to the physicians' usual charges for specific procedures, identified on the questionnaire by a procedure name and California Relative Value Scale number. Factor price information comes from cost-accounting data and data on utilization of nonphysician personnel requested by the questionnaire. Income and demographic data on the physician's patients are estimates of percentages of patients who fall into certain categories. Data from the questionnaire are supplemented with items from the AMA's bibliographical file on physicians (board certification and university faculty status, year license obtained, and physician age). Data pertaining to health insurance and physician-population ratios come from a variety of sources and are merged with individual physician records.

The following section reviews alternative theories of physician pricing and institutional aspects of health insurance. Section III contains specific hypotheses and brief variable descriptions. Empirical results are found in Section IV. Section V presents general conclusions and policy implications of this research.

II. CONCEPTUAL AND INSTITUTIONAL CONSIDERATIONS

Theories of Physician Pricing

Prior to 1970 most analysis of physician pricing was based on observance of market structure rather than parameter estimation. Most authors assumed profit-maximizing behavior and were concerned about the extent of monopoly power in the market for physicians' services.[1] In 1970, theories with some empirical support began to emerge that seriously questioned the validity of the profit-maximization assumption. These theories appear to have been given impetus by the observation of many that the market for medical services seems persistently unable to clear; that is, consumers are unable to satisfy their demands for physicians' services at prevailing prices.

Newhouse, in an article attempting to demonstrate the superiority

1. The most well-known of these "early" works, by Kessel, likened the collective behavior of the medical profession to that of a price-discriminating monoplist (see R. Kessel, "Price Discrimination in Medicine," *Journal of Law and Economics* 1 [October 1958]: 20–53; D. R. Hyde and P. Wolff, "The American Medical Association: Power, Purpose and Politics in Organized Medicine," *Yale Law Journal* 63 [May 1954]: 943–75; and E. Rayack, *Professional Power and American Medicine: The Economics of the American Medical Association* [Cleveland: World Publishing Co. 1967]).

of the monopoly view of medical practice versus competition, reported some empirical findings inconsistent with profit maximization.[2] Physicians' fees did not appear to respond to such demand variables as patient age, education, or insurance. Moreover, the effect of the physician-population ratio on fees was positive—a result that suggests that physicians may price in order to maintain a target income. According to the most naive version of this view, when the physician wishes to maintain his income in the face of rising practice costs and/or falling practice output, or if he desires to increase his target income under stable conditions, he raises his fees. Underlying this notion of pricing behavior is the assumption that demand for physicians' services is zero elastic or nearly so, and variations in demand are primarily the result of changes in incidence of illness and the number of physician providers rather than such financial variables as patient income and insurance.[3] Frech and Ginsburg, in a comment on Newhouse, demonstrated that Newhouse's tests based on regression analysis cannot distinguish between monopolistic and competitive pricing under standard profit-maximization assumptions.[4] This is also true of the present study. Other direct tests may properly distinguish between the two types of market structure.[5]

An alternative view of physician pricing behavior states that physicians price in order to maintain permanent excess demand for their services, allowing them some discretion to select the most medically interesting cases. This conclusion was reached by Feldstein after he obtained several implausible parameter estimates for his price-and-demand equations.[6] Such "unsatisfactory" empirical findings provide indirect evidence for extensive nonprice rationing, but more direct inquiries into the nature of non-price-rationing practices would be fruitful. Feldstein observed that utility maximization provides a more realistic framework for analyzing physician price and output behavior than does profit maximization per se. However, this deficiency of profit maximization may be readily eliminated by including terms to represents the physician's

2. J. Newhouse, "A Model of Physician Pricing," *Southern Economic Journal* 37 (October 1970): 174–83.

3. Haddock suggests to his physician colleagues that they should price in order to achieve a target income (D. Haddock, "Set Proper Charges on the Basis of Your Costs," *Medical Economics* [October 28, 1968], pp. 75–80).

4. H. E. Frech and P. B. Ginsburg, "Physician Pricing: Monopolistic or Competitive?" *Southern Economic Journal* 39 (April 1972): 573–77.

5. Some might argue that demand variables and such supply variables as the physician-population ratio would have no effect on fees if the physicians' services market were competitive. Such a test of market structure, however, is not powerful. In any given year, about 5 percent of physicians relocate (based on decennial data on physicians from U.S. censuses of population). Analysis of a single cross section of fees could well indicate a response to variations in demand and factor supply that persist in the short and intermediate run, even if the market were competitive. The "other direct tests" are found in J. P. Newhouse and F. A. Sloan, "Physician Pricing: Monopolistic or Competitive: Reply," *Southern Economic Journal* 39 (April 1972): 577–80.

6. M. S. Feldstein, "The Rising Price of Physicians' Services," *Review of Economics and Statistics* 52 (May 1970): 121–33.

valuation of his time in the practice-cost function. The physician's valuation may be specified to vary with such factors as age, health status, and practice output.[7]

If physicians behave in none of the above ways, they may price on the basis of a fixed percentage markup over average costs. Generally, this model assumes that the markup is based on average costs at a fixed level of capacity utilization.[8] If so, price should reflect cost, but not demand, variables.[9]

Medical Insurance and Reimbursement for Physicians' Services

While understandable in light of data limitations, the treatment of medical insurance in past research on physicians' fees has been inadequate. Relevant questions include not only how many consumers are insured, since virtually everyone has some type of insurance coverage, but also how much coverage and for what medical procedures, and what mechanisms by which reimbursable fees are determined and the procedures by which physicians are reimbursed. The following discussion is a brief description of insurance institutions that are relevant to the model and empirical analysis.

Commercial insurance companies and the 72 Blue Shield plans account for roughly 95 percent of those with coverage for physicians' services in the United States.[10] There are two main types of health

7. See F. A. Sloan, "Effects of Incentives on Physician Practice Performance," in *Health Manpower Productivity,* ed. J. Rafferty (Lexington, Mass.: D. C. Heath, in press).

8. References on markup pricing are R. L. Hall and C. J. Hitch, "Pricing Theory and Business Behavior," *Oxford Economic Papers* 2 (May 1939): 12–45; and M. K. Evans, *Macroeconomic Activity: Theory, Forecasting, and Control: An Econometric Approach* (New York: Harper & Row, 1969). Statements by Backman and by Owens imply physicians price on this basis (J. Backman, "Professional Fees: Factors Affecting Fee-Setting in Several Professions," *Journal of Accountancy* 95 [May 1953]: 554–66; A. Owens, "The Facts Behind the Big Fee Trends," *Medical Economics* [January 29, 1970], pp. 79–87). Laden interprets the theory to imply a markup without reference to a standard capacity-utilization level. If so, one might observe a negative relationship between such demand variables as consumer income and prices during a recession as firms are forced (by insufficient demand) to produce at an output level below minimum average cost (B. Laden, "Perfect Competition, Average Cost Pricing, and the Price Equation," *Review of Economics and Statistics* 54 [February 1972]: 84–88).

9. A cousin of the markup model is the target-rate-of-return theory of pricing. The target could be based on the physician's investment in his medical education, but the substantial interspecialty variation in rates of return on training is inconsistent with this view (unless one contends that the target in low-rate-of-return specialities requires annual return higher than are attainable in these fields) (see R. Lanzillotti, "Pricing Objectives in Large Companies," *American Economic Review* 48 [December 1958]: 921–40).

10. The remainder are covered by what is formally known as "independent" health insurance plans, including prepaid group practices and foundations for medical care (see M. Mueller, "Private Health Insurance in 1971: Health Care Services, Enrollment, and Finances," *Social Security Bulletin* 36 [February 1973]: 6, table 3, for a detailed breakdown).

insurance policies: "basic benefit" and "major medical." Basic policies provide "first-dollar" coverage (i.e., without a, or with a low, deductible or coinsurance) primarily for surgical and inpatient hospital care. A minority of policies provide in-office, clinic, and home benefits as well. Major medical does not provide first-dollar coverage, but rather is designed to protect against relatively large medical expenses. Reimbursement is generally not based on insurer fee schedules, as is true of most basic plans, but is limited by a ceiling on expenditures for a given episode of illness or period of time.[11] The vast majority of major medical policies are written by commercial insurers. All major medical plans have deductible and coinsurance provisions. Frequently, the major medical policy will cover services not included as part of the benefits of a basic plan, such as office and home physician visits. Most of commercial coverage for office and home visits is under a major medical rather than under a basic plan.[12]

Commercial insurers typically provide indemnity coverage and use fixed fee schedules for setting reimbursement limits. This is also true of Blue Shield plans, but the latter have developed two significant departures from these methods. The first is the "service-benefits" type of coverage, which applies primarily to subscribers whose incomes fall below a predetermined ceiling. Eligible subscribers are entitled to receive services from physicians who, by prior agreement, will accept the plan's reimbursement as payment in full. These physicians are entitled to charge indemnified patients (i.e., those who are not eligible for service benefits) for the difference between their charges and the plan's maximum reimbursable fees.[13]

Physicians who participate in service-benefit plans are assured of at least partial payment of any charge for a covered service (or, alternatively, more than the amount they would obtain via price discrimination in the absence of such third-party reimbursement). Although such plans have the potential of stimulating demand for physicians' services, this will only be the case if physicians agree to participate in such plans. Moreover, since service-benefit coverage applies mainly to low-income groups, its primary impact may be on the mean price the physician receives for a given procedure rather than his usual (modal) price, the dependent variable in the present study.

11. For a more complete description, see O. D. Dickerson, *Health Insurance* (Homewood, Ill.: Richard D. Irwin, 1968).

12. Health Insurance Association of America, *A Current Profile of Group Medical Expense Insurance in Force in the United States: December 1970* (New York: Health Insurance Association of America, 1972).

13. Not all service-benefit policies apply income limits, nor are all low-income subscribers eligible for service benefits. However, the majority of Blue Shield plans provide both indemnity and service-benefit coverage (see L. S. Reed and W. Carr, *The Benefit Structure of Private Health Insurance* [Washington, D.C.: Social Security Administration, Office of Research and Statistics Report no. 32, 1970]).

The second major departure is the use of "Usual, Customary, Reasonable" (UCR) reimbursement criteria by some Blue Shield organizations. In contrast to the use of fee schedules, under UCR, historical profiles of fees are established for individual physicians ("usual" fees) and for similar physicians in a community ("customary" fees). A claim is considered fully reimbursable if it is not in excess of what the physician usually charges for a given procedure and if it is not beyond some percentile level of fees customarily charged by similar physicians in the same community for the same procedure. Although data on the percentile cutoffs for UCR plans are not published, all references to provisions in specific plans place the cutoff in the upper tail of the fee distribution.

If these two criteria are not met, the claim may still be deemed "reasonable" and paid in full, if there are extenuating circumstances accounting for the magnitude of the claim. While fixed fee-schedule methods of reimbursement are still predominant, UCR has apparently made significant inroads, especially because of a trend toward UCR reimbursement in federally financed insurance purchases (e.g., Medicare and federal employees). By year-end 1971, roughly one-third of all Blue Shield "regular business" enrollees were covered by UCR insurance contracts.[14]

The UCR method may have a greater or lesser inflationary impact on fees than traditional fee schedules, depending on the following four factors: ease (to the physician) of changing the physician's "usual" charge; the percentile in the fee distribution used by the plan for determining the "customary" charge; the frequency that the fee distribution is updated by the plan for purposes of establishing the customary criterion; and the ease by which a charge not meeting "U" and "C" criteria of UCR can be termed "reasonable." Relative effects of the four cannot be deduced, but rather must be determined on the basis of empirical evidence.

In sum, the Blues may be characterized by their use of the service-benefits concept and UCR reimbursement criteria for some of their insured. Major medical plans constitute a much smaller share of their total health insurance package. There are also some minor differences pertinent to our empirical analysis. Judging from the descriptions by Reed and Carr, coverage for inpatient maternity benefits is more common among Blue than among commercial plans.[15] Maternity is sometimes one of the few excluded benefits in commercial major medical plans. Pre- and postnatal care is often excluded by both types of insurers. When reimbursement is made on the basis of fee schedules, the Blues and the commercials are roughly comparable.[16]

14. National Association of Blue Shield Plans, *Enrollment Reports* (Chicago: National Association of Blue Shield Plans, 1972).

15. Reed and Carr.

16. Dickerson, p. 259.

III. DEFINITIONS AND SPECIFICATION

The dependent variables are fees for four specific medical procedures selected from a set of eleven procedures listed on the AMA questionnaire. Two criteria form the basis for selection: (1) frequency of performance and (2) clarity to the physicians as to the content of the procedure. Preliminary analysis revealed that some procedures were ambiguous to respondents despite efforts to provide clear definitions. The four procedures selected are: follow-up office visit (termed office visit in the tables); follow-up hospital visit (hospital visit); appendectomy; and obstetrical delivery. Dependent variables and all monetarily expressed explanatory variables are deflated by an area price index.[17] All equations are linear. Under assumptions of profit maximization and a linear demand schedule, the resulting price equation is linear, even if, as is likely, the physician firm's cost function has certain nonlinearities, such as a quadratic term. Alternative theories of pricing behavior discussed above do not imply a specific functional form. Thus, linear price equations are as appropriate as any alternative form for evaluating these theories. Explanatory variables fall into three general categories: physicians' practice and personal characteristics; patient and community characteristics; and insurance-related variables.

Physicians' Practice and Personal Characteristics

The aggregated price of a "standard" bundle of office employees, WAGE, is designed to capture geographic variations in the wage level (for medical practice labor inputs other than the physician). The "standard" bundle represents national mean aide employment levels for each of the five physician fields included in the analysis. Rather than include our WAGE series in the price equations directly, values predicted from WAGE equations enter as independent variables. There are two reasons for employing this method. First, not all physicians responded to questions related to employee costs. Our technique provides a means for filling in missing values. Second, and more important, it is desirable to measure the fee response to factor prices the physician faces rather than to those he actually pays. Actual factor payments would be endogenous, and the resulting parameter estimates would be biased and inconsistent if the instrumental-variable technique had not been employed. All theories of physician fee setting require practice-cost variables. The expected coefficient of WAGE is positive.

The dummy variable SHAR takes the value one if more than 50

17. Price-level data come from U.S. Department of Labor, Bureau of Labor Statistics, *Handbook of Labor Statistics, 1971* (Washington, D.C.: Government Printing Office, 1971), p. 294. Physicians located in rural areas have been assigned nonmetropolitan index values for the census area; physicians in urban areas have been assigned Standard Metropolitan Statistical Area (SMSA) index values. Index values are not available for all SMSAs. To fill in missing values, we have assigned the index value of a proximate SMSA of similar size.

percent of the physician's medical income comes from practice arrangements in which revenues are shared with other physicians. The potential effects of SHAR are exceedingly complex, and our treatment of this factor in this general study of physicians' fees must be regarded as tentative. Revenue sharing is associated with larger practice size, and many have hypothesized that potential economies of scale may make group more efficient than solo practice.[18] If so, SHAR's coefficient would be expected to be negative, as greater practice efficiency would result in lower prices for the physician's product. However, this may be a naive view of medical practice. Where both revenues and costs are shared, the financial return to individual effort may become lower as group size rises. To the extent that output and price decisions are made by individual group members, sharing may result in lower output and higher price.[19] To the degree that prices are set collectively by group members, the cost of ascertaining the profit-maximizing price per physician may well be less than in solo practice. If the usual response to partial knowledge of market conditions is to keep price below the price consistent with profit maximization, sharing information costs may result in a higher price.[20] It is possible, of course, that scale economies dominate initially and the other factors dominate only for large practice sizes. As specified, SHAR does not permit measurement of a nonlinear relationship between group size and fees. Results of experiments with a specification that does are briefly reported below.

Dummy variable BD and FAC assume the value one if the physician is board certified or has a medical school faculty appointment, respectively. These variables are measures of the physicians' credentials and, possibly, of the technical quality of their services. As such, these demand variables are expected to be positively related to price.

Age and/or experience of the physician are indicated by LIC10, AGE55, and AGE65. If the physician received his license in the state of his current (as of 1971) mailing address within the last 10 years, LIC10 equals one. The expected sign of this variable is uncertain due to offsetting effects. Physicians who are relatively new in their practice locations may be expected to be in the process of building their practices and, consequently, would tend to charge relatively low fees in order to attract patients. However, these physicians may also have been the recipients of a more technically advanced medical education than older physicians. This "vintage" effect implies a positive association with fees.

The AGE55 and AGE65 variables equal one for physicians in the

18. For example, see R. Fein, *The Doctor Shortage: An Economic Diagnosis* (Washington, D.C.: Brookings Institution, 1967); and J. A. Boan, *Group Practice* (Ottawa: Royal Commission on Health Services, 1966).

19. This point is discussed more fully in Sloan (see n. 7).

20. Price will be set lower by the profit-maximizing firm under uncertainty if certain (plausible) conditions pertaining to demand and cost functions are satisfied (see H. E. Leland, "Theory of the Firm Facing Uncertain Demand," *American Economic Review* 62 [June 1972]: 278–91).

55–64 and the 65-and-over age categories, respectively. These variables are also subject to offsetting effects. Physicians' preferences for leisure may increase at older ages, in which case price may be used as a rationing device to reduce patient load, implying a positive association with fees. Offsetting this relationship is the vintage effect mentioned above. Older physicians may be regarded as having had a technically inferior medical education, implying a lower-quality medical care product and a negative association with fees. In addition, the expected reduction in workload may not be accompanied by increased prices if the physician considers patient utility as an argument in his price-setting decisions. Since plausible hypotheses with conflicting predicted effects of LIC10, AGE55, and AGE65 can be developed, these variables are included in the price equation without a priori prediction as to their effect.

Patient and Community Characteristics

The percentages of the physician's patients with family incomes over $15,000 per year and under $5,000 per year (as reported by the physician) are YGT15 and YLT5. A positive impact on fees is expected for the former, and a negative effect is predicted for the latter. The percentage of the physician's patients who are 65 years of age or older is given by PAT65. Nearly all of this population group have Medicare insurance coverage for physicians' services. Because the need for medical services among persons in the post–age 65 group is relatively high and because of extensive third-party coverage for physicians from this group, the expected sign of the PAT65 coefficient is positive. Although it would be desirable to measure YGT15, YLT5, and PAT65 for the physician's market area rather than his practice, the ideal measure is not available. Data for the physician's practice probably provide better approximations than would data for the physician's county or state.

Our two measures of relative physician supply in the physician's geographic location are MDPOP1 and MDPOP2. The first is the number of physicians in the physician's field per 1,000 population; the second is the number of physicians in other fields per 1,000 population. Past research has identified a positive association between gross physician-to-population ratios and physicians' fees, which is largely responsible for the view held by some researchers that physicians set fees to achieve a target income. However, the use of gross measures of physician supply does not permit distinguishing among varying degrees of substitutability of services of physicians in different specialities. Inclusion of MDPOP1 and MDPOP2 is intended to make such a distinction. The within-field cross-elasticity of demand should be higher than the between-field cross-elasticity. Since physicians in the same field are more likely to be competitors than those in different fields, the expected sign of MDPOP1 is negative. Our prediction for MDPOP2 must be tempered by the findings of past research. One plausible explanation for a positive association between MDPOP2 and fees is that physicians in different fields may

act as referral sources for one another, implying a positive cross-elasticity of demand. If the positive association between relative physician supply and fees is maintained, it is expected to be weaker for MDPOP1 than for MDPOP2.[21]

Insurance Related Variables

The final class of explanatory variables pertains to third-party reimbursement. Each variable corresponds to the physician's geographic area of practice (state or insurance-plan catchment area).

Several structural differences between health insurance provided by Blue Shield plans and by commercial carriers were presented above. The percentage of total health insurance benefit paid by commercial insurers in 1969, by state—BENR—measures the net effect of these differences on physicians' fees. It is not possible to predict the sign of the coefficient of BENR a priori. To the extent that commercial insurance provides more extensive coverage for physicians' office and home visits, the sign should be positive. But the Blues appear to cover ambulatory services that are close substitutes to inpatient services more comprehensively.[22] If Blue Shield's application of the service-benefit concept depresses physicians' usual fees, this factor would tend to make BENR's coefficient positive. Since maternity coverage appears to be more extensive for Blue Shield, BENR may be expected to have a negative impact on obstetrical delivery fees. If "usual-customary-reasonable" reimbursement is on the whole more (less) inflationary than fee schedules, the sign of BENR should be negative (positive). Since fee schedules do not differ systematically by type of insurer, they do not affect BENR's interpretation. Clearly, whatever the findings of this study may be with regard to BENR, further analysis of the underlying mechanisms associated with this variable will be required before definite statements about the net effect of the two types of insurance can be made.

The percentage of persons under age 65 in the physician's state who have regular medical or surgical basic insurance coverage is given by BMED. Whether BMED is surgical or medical insurance depends on the procedure's being analyzed. A positive relationship with fees is expected. The percentage of the population covered by major-medical in-

21. Shortell provides estimates of the proportions of patients received on referral by speciality: general practitioners—3 percent; pediatricians—5 percent; obstetricians/gynecologists—19 percent; internists—22 percent; and general surgeons—55 percent (S. M. Shortell, *A Model of Physician Referral Behavior: A Test of Exchange Theory in Medical Practice* (Chicago: Center for Health Administration Studies, University of Chicago, Research Series no. 31, 1972), p. 5.

22. Results from an analysis of hospital outpatient visits and inpatient admissions (see K. Davis and L. B. Russell, "The Substitution of Hospital Outpatient Care for Inpatient Care," *Review of Economics and Statistics* 54 [May 1972]: 109–20. Procedures provided by hospital outpatient departments are likely to be closer substitutes to inpatient care on the whole than are physician office and home visits to inpatient care.

surance coverage, by state—MMED—should have a positive impact on fees.[23] As stated in the previous section, a large percentage of coverage for office and home visits is under major medical policies. In addition, major medical typically covers physicians' charges for surgical procedures in excess of the insurer's basic-plan fee schedule or total-expenditure ceiling.

Although "usual-customary-reasonable" reimbursement is essentially a concept of the Blues, it has by no means been adopted by all Blue Shield plans. There is considerable geographic variation in the percentage of Blue reimbursement based on these criteria. The variable UCR is the percentage of persons in the Blue Shield market area in which the physician is located who are covered by Blue Shield UCR policies. Depending on the relative strength of the four factors reviewed in the previous section, the coefficient will be positive, zero, or negative.

The Blue Shield fee schedule (maximum reimbursable fee) for a given procedure of the "most prevalent plan" in a Blue Shield market area in 1968 is given by SCHD. Despite certain weaknesses in the data (the gap between the collection dates of Blue Shield fee-schedule data and the AMA data, and that the "most prevalent plan" fee-schedule data are not necessarily representative of all Blue Shield fee schedules within a given market area), a positive relationship with fees is expected.[24]

IV. EMPIRICAL FINDINGS

Table 1 presents means and standard deviations of variables included in the regressions; and table 2, parameter estimates of the price-equation regressions.[25] The equations explain between 28 and 41 percent of the variance in fees for general practitioners and between 13 and 41 percent for specialists. The R^2s are reasonably high, considering that the observational unit is the individual practitioner.[26] The patient-community

23. The MMED was constructed by adding actual persons covered by commercial major medical policies to an estimate of those covered by Blue Shield major medical, and dividing by state population. The Blue Shield estimate is the number of persons covered by Blue Shield basic plans deflated by the national proportion of Blue Shield subscribers covered by major medical. The potential error in this variable is minimized by the fact that the vast majority of major medical policies are written by commercial insurers.

24. Blue Shield fee-schedule data exist for three of the four procedures examined in the present study, all except the follow-up office visit. The Blue Shield fee schedule selected for inclusion in the hospital-visit price regressions is for the fourth hospital day.

25. GP in table 1 stands for general practice; GS for general surgery; IM for internal medicine; OBG for obstetrics-gynecology; and PED for pediatrics.

26. Several explanatory variables discussed above have been excluded from table 2. The dummy variable signifying medical school faculty appointment (FAC) has been excluded from general practitioner equations, as very few GPs have such appointments. Percentage of patients age 65 older (PAT65) has been excluded from obstetrical delivery equations and from the pediatrician office-visit equation as these procedures are not applicable to older patients. Finally, the variable SCHD does not enter the office-visit regressions because the appropriate

Table 1
Variable Means and Standard Deviations

Variable	GP	GS	IM	OBG	PED
Office visit	6.99	7.90	9.66	9.48	7.71
	(1.60)	(2.37)	(3.21)	(2.84)	(1.94)
Hospital visit	8.06	...	10.38	...	...
	(2.92)	(...)	(3.56)	(...)	(...)
Appendectomy	216.43	246.50	...	...	...
	(58.63)	(59.31)	(...)	(...)	(...)
Obstetrical delivery	198.33	...	...	271.53	...
	(56.74)	(...)	(...)	(68.19)	(...)
WAGE	246.22	239.73	237.41	251.60	237.26
	(23.73)	(20.46)	(21.58)	(23.59)	(20.68)
SHAR	0.46	0.66	0.58	0.61	0.63
	(...)	(...)	(...)	(...)	(...)
BD	0.11	0.67	0.52	0.72	0.73
	(...)	(...)	(...)	(...)	(...)
FAC	...	0.12	0.15	0.13	0.18
	(...)	(...)	(...)	(...)	(...)
LIC10	0.25	0.26	0.34	0.30	0.42
	(...)	(...)	(...)	(...)	(...)
AGE55	0.24	0.23	0.18	0.16	0.11
	(...)	(...)	(...)	(...)	(...)
AGE65	0.09	0.07	0.06	0.07	0.05
	(...)	(...)	(...)	(...)	(...)
YGT15	13.52	18.94	21.77	19.41	17.38
	(13.11)	(16.07)	(18.11)	(16.09)	(16.08)
YLT5	25.84	19.04	16.65	15.50	18.38
	(22.34)	(16.95)	(16.08)	(16.17)	(18.85)
PAT65	27.55	32.46	39.51	8.66	...
	(17.84)	(18.27)	(21.11)	(8.74)	(...)
MDPOP1	0.31	0.50	0.61	0.09	0.09
	(0.11)	(0.40)	(0.69)	(0.02)	(0.03)
MDPOP2	1.17	1.24	1.55	1.93	1.84
	(1.21)	(1.07)	(1.18)	(1.38)	(1.30)
BMED (regular medical)	72.77	72.94	74.41	...	...
	(13.82)	(13.65)	(13.57)	(...)	(...)
BMED (surgical)	83.50	83.50	...	...	...
	(10.78)	(10.90)	(...)	(...)	(...)
MMED	47.88	47.71	48.99	...	...
	(10.02)	(9.86)	(9.96)	(...)	(...)
UCR	13.39	14.36	13.89	...	...
	(11.34)	(12.64)	(11.44)	(...)	(...)
BENR	56.65	56.60	55.49	...	...
	(10.91)	(11.20)	(10.52)	(...)	(...)
SCHD (hospital visit)	5.42	...	5.49	...	...
	(1.12)	(...)	(1.00)	(...)	(...)
SCHD (appendectomy)	151.12	149.82	...	...	...
	(29.02)	(29.37)	(...)	(...)	(...)
SCHD (delivery)	73.75	...	...	...	...
	(26.61)	(...)	(...)	(...)	(...)

NOTE.—Numbers in parentheses are standard deviations.

characteristics and reimbursement groups of variables perform better

fee-schedules data are not available. Dummy variables designating graduates of foreign medical schools were included in preliminary regressions but were excluded when implausibly positive (but insignificant) parameter estimates were obtained.

on the whole than those describing the physician's practice and personal characteristics. The relatively poor performance of the third category may be largely traced to the fact that many variables in the category incorporate offsetting effects, for example, the effects of age and vintage in LIC10, AGE55, and AGE65. These variables are well measured; it is therefore unlikely that poor results reflect errors-in-variables biases.

Results for specialists appear to be broadly consistent with those for general practitioners. However, *F*-tests for regression-coefficient homogeneity, performed on comparable general practitioner and specialist fee equations (the appendectomy fee for general practitioners and surgeons, and the obstetrical delivery fee for general practitioners and obstetrician/gynecologists) reveal structural differences between generalists and specialists.[27]

Physician's Practice and Personal Characteristics (WAGE, SHAR, BD, FAC, LIC10, AGE55, AGE65)

Of all explanatory variables, the ancillary personnel wage (WAGE) has the most definite impact on fees, judged both in terms of significance levels and elasticities associated with the parameter estimates. The coefficient of WAGE always has a positive sign, as expected. Elasticities, evaluated at the means of observations, range from 0.45 (eq. [9] to 1.16 (eq. [2]). The elasticity is below 0.8 in only two equations (eq. [9] and [11]). Although WAGE is the only variable present in the regressions that measures physicians' practice costs, ancillary personnel wages are clearly the most important of these, and aside from space costs are the most likely to vary among physicians. According to unpublished AMA data, nearly 50 percent of total practice-related expenses in 1970 were from salaries paid to office employees.[28]

Results concerning the revenue-sharing parameter estimate (SHAR) are mixed. The coefficient has a negative sign in seven of 11 equations and attains statistical significance in five; however, one of the latter coefficients has a positive sign. No pattern with regard to specialty type (generalist versus specialist) or type of procedure (surgical versus nonsurgical) is discernible. To test whether these ambiguous findings reflect the aggregative nature of the SHAR variable, we created individual dummy variables to represent different practice sizes (solo, two to five M.D.'s, over five M.D.'s). Results using this latter approach were also inconclusive.[29] Much more detailed research that takes specific

27. More such tests were not performed because there is greater generalist-specialist variance in the content of other procedures.

28. In a preliminary analysis of physicians' fees, a variable descriptive of physicians' capital costs as measured by office and equipment expenses (including rent, depreciation, and interest), deflated by square feet of office space, was created. However, it proved to be too imprecise to obtain satisfactory parameter estimates.

29. These results are not presented.

Table 2
Price Equations

DEPENDENT VARIABLE	WAGE	SHAR	BD	FAC	LIC10	AGE55	AGE65	YGT15	YLT5
GENERAL PRACTITIONERS									
1. OFFICE VISIT	0.024*	0.034	0.132	-	0.133	0.500*	0.301	0.013*	-0.011*
	(0.003)	(0.108)	(0.164)	(-)	(0.126)	(0.138)	(0.212)	(0.004)	(0.003)
2. HOSPITAL VISIT	0.038*	-0.596*	-0.057	-	0.253	0.855*	-0.014	0.026*	-0.017*
	(0.006)	(0.203)	(0.296)	(-)	(0.233)	(0.263)	(0.468)	(0.008)	(0.005)
3. APPENDECTOMY	0.743*	6.89	9.45	-	-6.67	13.70	-7.01	-0.142	-0.424*
	(0.177)	(6.62)	(11.54)	(-)	(8.13)	(7.80)	(17.54)	(0.307)	(0.164)
4. OBSTETRICAL DELIVERY	0.794*	16.83*	-11.20	-	-4.46	7.83	-1.54	-0.136	-0.671*
	(0.158)	(5.52)	(7.79)	(-)	(6.29)	(7.50)	(14.77)	(0.248)	(0.148)
GENERAL SURGEONS									
5. OFFICE VISIT	0.030*	-0.584*	0.047	-0.215	0.228	-0.133	-0.0023	0.0081	-0.0080
	(0.005)	(0.195)	(0.202)	(0.300)	(0.212)	(0.223)	(0.400)	(0.006)	(0.006)
6. APPENDECTOMY	0.854*	-6.36	7.81	-6.44	5.82	-3.34	-17.09	0.511*	-0.046
	(0.129)	(4.44)	(4.62)	(7.01)	(4.81)	(5.10)	(9.93)	(0.128)	(0.124)
INTERNISTS									
7. OFFICE VISIT	0.033*	-0.714*	0.310	-0.473	0.262	-0.020	0.447	0.036*	-0.020**
	(0.007)	(0.248)	(0.242)	(0.355)	(0.272)	(0.319)	(0.517)	(0.007)	(0.008)
8. HOSPITAL VISIT	0.047*	-1.07*	0.481	-0.743	0.866*	-0.222	-0.205	0.042*	-0.023**
	(0.009)	(0.300)	(0.291)	(0.418)	(0.322)	(0.379)	(0.646)	(0.0081)	(0.010)
OBSTETRICIAN/GYNECOLOGISTS									
9. OFFICE VISIT	0.017**	-0.284	0.602	0.335	0.201	0.324	1.38	0.013	-0.0091
	(0.007)	(0.333)	(0.367)	(0.497)	(0.365)	(0.460)	(0.707)	(0.010)	(0.011)
10. OBSTETRICAL DELIVERY	0.832*	-6.20	5.09	2.95	22.78**	4.72	14.69	0.317	-0.767*
	(0.165)	(8.06)	(8.78)	(11.80)	(8.72)	(11.14)	(16.75)	(0.243)	(0.254)
PEDIATRICIANS									
11. OFFICE VISIT	0.015*	0.159	-0.048	-0.130	-0.299	-0.432	1.04**	0.0087	-0.015**
	(0.005)	(0.218)	(0.237)	(2.75)	(0.217)	(0.343)	(0.468)	(0.007)	(0.006)

*Means significant at the one percent level (two-tail).
**Means significant at the five percent level (two-tail).
Numbers in parentheses are standard errors of the parameter estimates.

revenue- (and/or cost-) sharing arrangements and other aspects of decision making within the practice into account is needed.[30]

Coefficients of variables identifying physicians with specialty board certification and those with medical school faculty appointments (BD and FAC) are both positive and negative and are never statistically significant. To the extent that BD and FAC are quality indicators, these findings have two primary implications. First, quality may fail to be reflected in price in the presence of consumer ignorance.[31] Second, if quality has an impact on physician decisionmaking, it may be manifested in product mix rather than fees. For example, surgeons who are board certified may attempt to concentrate on more complex (and more remunerative) procedures than relatively simple surgical procedures such as appendectomies.[32] Signs of recently licensed physician coefficients

30. For specific suggestions, see Sloan.

31. Numerous discussions are present in the literature on the relationships between consumer ignorance and various features of the market for medical care. The evidence of Peterson, et al. indicates that physician quality as judged by a medical audit is not closely related to physician income (O. Peterson, L. P. Andrews, R. S. Spain, and P. G. Greenberg, *An Analytical Study of North Carolina General Practice, 1953–1954* [Evanston, Ill.: Association of American Medical Colleges, 1956]).

32. The AMA data on frequency of performance of procedures provide some support for the view that physician credentials may be associated with product mix. When standardized for number of hours of direct patient care, the frequency of follow-up visits of the type identified on the AMA survey was less for board-certified than for non-board-certified physicians, and the frequency of performance of appendectomies was less for board-certified than for non-board-certified general practitioners and general surgeons. Frequencies of performance

Table 2 (Continued)

PAT65	MDPOP1	MDPOP2	BMED	MMED	UCR	BENR	SCHD	CONSTANT	
0.0079**	-1.40*	0.220*	-0.013	0.039*	-0.0001	0.0086	-	-0.382	R^2=0.29
(0.003)	(0.48)	(0.046)	(0.007)	(0.008)	(0.005)	(0.007)	(-)	(-)	F(15,682)=18.33*
0.017*	-1.63	0.438*	-0.004	0.034**	-0.035*	0.021	0.033	-4.020	R^2=0.28
(0.006)	(0.92)	(0.088)	(0.014)	(0.015)	(0.010)	(0.014)	(0.091)	(-)	F(18,592)=12.94*
0.023	23.28	2.02	-0.182	1.95*	0.048	1.29**	0.545*	206.42	R^2=0.41
(0.218)	(26.12)	(2.59)	(0.448)	(0.517)	(0.409)	(0.513)	(0.142)	(-)	F(18,212)=8.12*
-	-12.22	3.82	-1.22*	1.22*	0.429	-0.087	-0.0067	56.54	R^2=0.29
(-)	(21.70)	(2.37)	(0.428)	(0.403)	(0.285)	(0.340)	(0.106)	(-)	F(17,316)=7.75*
0.0067	0.799	0.421	0.014	0.031**	-0.015	-0.020	-	-1.26	R^2=0.26
(0.005)	(0.752)	(0.283)	(0.011)	(0.012)	(0.008)	(0.011)	(-)	(-)	F(16,545)=11.96*
-0.124	-39.28**	26.34*	-0.804*	1.33*	0.0080	0.721*	0.476*	-81.54	R^2=0.41
(0.113)	(17.27)	(6.57)	(0.293)	(0.286)	(0.182)	(0.235)	(0.083)	(-)	F(19,538)=19.53*
0.0023	4.12*	-1.04**	-0.031**	0.053*	-0.021	0.0067	-	0.477	R^2=0.31
(0.006)	(0.889)	(0.485)	(0.016)	(0.018)	(0.013)	(0.017)	(-)	(-)	F(16,531)=14.87*
0.015**	1.28	-0.013	-0.0061	0.050**	-0.045*	-0.0033	0.041	-3.96	R^2=0.30
(0.007)	(1.07)	(0.590)	(0.019)	(0.023)	(0.016)	(0.021)	(0.132)	(-)	F(19,493)=11.26*
-0.0061	16.82**	0.605*	-	-	-	-	-	1.87	R^2=0.21
(0.018)	(6.70)	(0.114)	(-)	(-)	(-)	(-)	(-)	(-)	F(12,272)=6.17*
-	416.11*	10.51*	-	-	-	-	-	1.92	R^2=0.22
(-)	(159.04)	(2.96)	(-)	(-)	(-)	(-)	(-)	(-)	F(11,267)=6.95*
-	5.14	0.218	-	-	-	-	-	3.40	R^2=0.13
(-)	(3.61)	(0.115)	(-)	(-)	(-)	(-)	(-)	(-)	F(11,236)3.34*

(LIC10) vary; coefficients of physicians in the 55–64 (AGE55) and 65-and-over (AGE65) age group variables also vary and seldom attain statistical significance. There are too many offsetting factors to produce stable estimates.

Patient and Community Characteristics (YGT15, YLT5, PAT65, MDPOP1, MDPOP2)

High patient-income (YGT15) coefficients are consistently positive (withtwo exceptions, noted below), and low patient-income (YLT5) coefficients are consistently negative. The coefficients are statistically significant in the majority of equations. The responsiveness of fees to patient income, especially for general practitioners, is low. For example, if the percentage of patients with family incomes below $5,000 fell 10 percentage points and the percentage with family incomes above $15,000 increased by the same amount, the office-visit fee of GPs would rise only $0.24 (based on eq. [1] estimates). The mean general practitioner office-visit fee in 1971 was $6.99. The negative sign of YGT15 in equations [3] and [4] indicates that general practitioner–performed appendectomies and obstetrical deliveries may be inferior goods. There is interspecialty variation in the price response to patient income. The most distinct pattern is for internists. Both income parameters for this specialty are significant. The impact of income is over twice as strong as for general practitioners, further evidence to support the contention

of hospital visits and obstetrical deliveries were not examined because the former procedure is associated with the performance of other procedures in the hospital and product-mix variations pertaining to deliveries would likely be manifested in procedures related to the delivery rather than the delivery itself.

that the apparent unresponsiveness of general practitioners' fees to patient income is partially due to more affluent patients selecting a physician with more formal training. This conclusion is also supported by data on means for YGT15 and YLT5 by specialty presented in table 1.

The parameter estimates of the patients-age-65-and-over (PAT65) variable tend to be positive, as expected. This tendency is most apparent in the case of visits (office and hospital) to general practitioners. However, judging from the coefficients, the response of price to this variable is low.

A positive and strong association between physician-to-population ratios and prices has been demonstrated consistently in the past.[33] Our results do not fully refute this evidence, but they do suggest that valuable insights may be gained from disaggregating components of physician supply.

Parameter estimates relating to the within-field and across-field physician-to-population ratio variables (MDPOP1, MDPOP2) show different effects for general practitioners than for specialists. In three out of four general practitioner equations, MDPOP1's coefficient is negative and substantially larger (in absolute value) than MDPOP2's, which is positive in all cases. The results for specialists, generally positive signs for both coefficients, may reflect the effect of queues (that is, as the physician-population ratio rises, waiting time—and thus the total price of physicians' services—falls), types of "nonstandard" (non-profit-maximizing) behavior described above, and/or referral patterns. The mechanism underlying the specialist of MDPOP parameter estimates remains to be established. The behavior of general practitioners (who in 1971 constituted 43 percent of physicians in the five major fields)[34] is more consistent with "standard" economic theory.[35]

Insurance Coverage and Methods of Physician Reimbursement (BMED, MMED, UCR, BENR, SCHD)

The null hypothesis that the coefficients of all insurance-related variables in combination are zero is rejected at the .01 level of significance in all

33. See, for example, Feldstein; and Newhouse.

34. G. A. Roback, *Distribution of Physicians in the U.S.*, 1971 (Chicago: American Medical Association, 1972), p. 35.

35. Data used to calculate MDPOP1 and MDPOP2 were somewhat crude in some regressions. Measurement of MDPOP1 and MDPOP2 is better for general practitioners than for specialists. Only in general practice is the MDPOP1 variable restricted to physicians in the physician's own speciality and MDPOP2 to physicians in all other specialities. For general surgeons and internists, MDPOP1 is the ratio of all surgical specialists and of all medical specialists (much broader categories) to county population, respectively. Data used to calculate MDPOP1 for obstetrician and pediatrician equations correspond to the physicians' state rather than county, and the numerator of MDPOP2 is total physicians in these equations. Because of these measurement considerations, the general practitioner results merit more confidence.

equations except those pertaining to obstetrician/gynecologists and pediatricians, where the F-values are far below the .05 level of significance. The insurance variables have therefore been omitted from the latter equations.

Except for appendectomies, the most distinct relationship is between major medical insurance coverage (MMED) and fees. The coefficient of MMED is positive and significant in all equations; the corresponding elasticities are in the 0.19–0.30 range. In contrast, the coefficients of BMED, the variable describing extent of regular medical or surgical insurance coverage, are unexpectedly negative (except in eq. [5]). The negative BMED coefficients probably reflect multicollinearity between BMED and MMED.

Signs of UCR, the percentage of population in the physician's area covered by Blue Shield "usual-customary-reasonable" insurance policies, tend to be negative, and signs of BENR, the percentage of total insured persons in the physician's area that were covered by commercial insurance policies (as opposed to Blue Shield), tend to be positive. However, there are enough positive signs in the former case and negative signs in the later to preclude definitive conclusions. Our prediction, based on prior evidence, that BENR's sign would be negative in the case of maternity care is not supported by the regression results.[36]

The insurer's fee schedule (SCHD) is an important price determinant for appendectomies. Judging from table 1, the mean fee schedule is well below the mean usual fee for both general practitioners and general surgeons. The schedules, however, are for 1968, and mean fees are for 1971. If 1971 fee-schedule data had been available, the means for fee schedules and appendectomy fees would have been somewhat closer. The variable SCHD does not attain significance in hospital-visit and obstetrical delivery equations, reflecting the fact that coverage for these procedures is not nearly as widespread as for appendectomies.

V. CONCLUSION

Since the study's primary data source comes from a mailed questionnaire, and several demand variables do not exactly correspond to the physician's market area, this study's principal findings should be confirmed with data obtained by comprehensive interviews with physicians. The following conclusions should serve both as a basis for further research on physicians' fee determinants, and—until results of such research are available—as a tentative guide to policymakers.

Findings of the present study indicate that wages paid to office employees is consistently an important determinant of physicians' fees. Nurses constitute an important class of employees. Available evidence

36. The sign is negative and insignificant in the general practitioners' obstetrical delivery regression, but positive and significant at the 5 percent level in a preliminary obstetrical delivery regression for obstetricians. Parameter-estimate results of insurance-related variables have been excluded from final regressions for obstetricians shown in table 2.

indicates that the hospital is the effective wage setter of nurses' salaries in physicians' offices and elsewhere.[37] Current evidence also indicates that hospital wage inflation is partly a result (not necessarily a cause) of inflation in hospital prices, which, in turn, is largely due to increased demand for hospital care arising from increased hospital insurance coverage.[38] To the extent that hospitals set wage patterns for personnel in the health field, inflationary trends in hospital wages are directly translatable into fee increases in the market for medical services.

The insignificance of quality-related explanatory variables suggests that attainment of greater credentials, at least within specialties, need not lead to higher fees. However, this general conclusion masks several potentially important factors. First, credentials may be linked to other physician decisions (e.g., product mix, organizational setting) that exert an influence on total revenues and on aggregate patient costs, if not unit prices. Second, specialists do charge higher prices for given procedures than generalists. On the supply side, the trend toward increased specialization implies increasing prices when aggregated across specialties, while on the demand side, the tendency for patients to substitute the services of specialists for those of generalists as income increases has the same implication. Third, the positive association between vintage and fees, though difficult to disentangle from the effects of other age-related variables, has policy relevance in view of the current movements toward compulsory continuing education and periodic recertification of practicing physicians.

Results pertaining to insurance-related variables give some insight into the effects on fees of types and levels of insurance coverage and of reimbursement mechanisms. The latter were not shown to be consequential, but, clearly, more research is needed. Judging by the regression results, insurance appears unimportant in some medical fields (obstetrics/gynecology, pediatrics) but quite important in others (general practice, general surgery, internal medicine). The significance of the major-medical variable is of particular interest in light of the current policy issue of universal catastrophic health insurance. Our results suggest that, contrary to the view held by many, such plans may result in substantial fee inflation, regardless of the presence of copayment provisions.

The present findings also shed light on the physician decision-making process. Since demand variables exert a definite impact on fees, the markup-pricing mechanism theory appears to provide an inferior explanation of physician behavior. Results concerning the effect of phy-

37. D. E. Yett, "The Chronic 'shortage' of Nurses: A Public Policy Dilemma," in *Empirical Studies in Health Economics,* ed. H. E. Klarman (Baltimore: Johns Hopkins Press, 1970).

38. M. S. Feldstein, "Hospital Cost Inflation: A Study in Nonprofit Price Dynamics," *American Economic Review* 61 (December 1971): 853–72; and *The Rising Cost of Hospital Care* (Washington, D.C.: Information Resources Press, 1971).

sician-population ratios on fees diminish the credibility of the target-income model somewhat. Moreover, if nonprice rationing were a dominant force, as suggested by Feldstein, the empirical findings should have resulted in fewer plausible coefficients.[39] In general, our empirical results are sufficiently consistent with the "standard" profit-maximization model to suggest that future work should be based on the behavioral assumptions of profit-maximizing-type models.[40]

39. Feldstein, "The Rising Price of Physicians' Services."

40. As stated earlier, the profit-maximizing model can be altered to accommodate a term to represent the value the physician places on his own time without changing the basic form of the model.