AD 684031

A MODEL OF PHYSICIAN PRICING

Joseph P. Newhouse[1]

The Rand Corporation, Santa Monica, California

Knowledge about the economics of medical care is still so scanty that it is not clear whether the market for physician services can be better characterized as monopolistic or competitive. This paper attempts to shed some light upon that question. Although physicians are commonly cited as an example of discriminating monopoly (that is, they vary their fees according to patient income), supporting evidence is generally lacking.[2] Gaston Rimlinger and Henry Steele have presented some evidence that fees vary with patient income, although the main focus of their article is on the spatial distribution of physicians.[3] Their evidence, which we do not believe is conclusive, will be considered below. Reuben Kessel, in a 1958 article, assumes that physicians are discriminating monopolists and directs his attention toward analyzing mechanisms to prevent price cutting.[4] The major

---

[1]Any views expressed in this paper are those of the author. They should not be interpreted as reflecting the views of The Rand Corporation or the official opinion or policy of any of its governmental or private research sponsors. Papers are reproduced by The Rand Corporation as a courtesy to members of its staff. The author would like to acknowledge the comments of Frank Sloan, Vince Taylor, Marvin Kosters, and Arthur Alexander.

[2]For references to textbooks which cite physicians as a case of discriminating monopoly, see Herbert Klarman, The Economics of Health; New York: Columbia University Press, 1965, p. 21.

[3]Gaston V. Rimlinger and Henry B. Steele, "An Economic Interpretation of the Spatial Distribution of Physicians in the U.S.", Southern Economic Journal, July 1963, 30:1, pp. 10, 11. Rimlinger and Steele point out that discriminatory pricing leads high income areas to have more physicians than they otherwise would have.

[4]Reuben A. Kessel, "Price Discrimination in Medicine," Journal of Law and Economics, October 1958, pp. 20-53. Elton Rayack, Professional Power and American Medicine; New York: World Publishing Company, 1967, has argued that the American Medical Association has in the past tried to control the number of physicians. We do not consider his arguments here for two reasons: (1) it is not clear they hold today; (2) even assuming total supply were limited, price might still be set competitively (it would include, in that case, economic rent). We are interested in pricing policy.

mechanism he cites is sanctions applied by organized medicine against physicians who may be price cutters.[1] There is reason to think, however, that such sanctions may no longer be important, so that if they underlay monopolistic pricing, it may no longer exist. The spread of third party payment mechanisms which reimburse the hospital on the basis of its cost has meant the hospital has a smaller incentive to keep costs down.[2] The spread of insurance for physicians' services may have reduced the physicians' ability to discriminate.

The view that physicians are not profit-maximizing monopolists has also appeared in the literature. Arrow, in something of an aside, pointed out that the observed low price elasticities for physicians' services are incompatible with profit-maximizing monopolistic pricing.[3] Gabarino, in a 1959 article on the market for physicians' services, writes as though the market were competitive and price determined by

---

[1]The American Medical Association has the power to certify the hospital for internship and residency programs. Kessel points to this power as an instrument to promote cartel-like behavior. He argues that the marginal revenue product of interns and residents exceeds their marginal cost, so that hospitals are eager to obtain certification. The AMA has a rule, however, that no hospital can be certified for intern and resident training unless all of its staff are members of the local medical society. Hence, expulsion from the local medical society is a strong sanction against price cutting, for "lack of membership [in the local medical society] implies inability to become a member of a hospital staff." (Kessel, op.cit., p. 31.) Kessel also points out that membership in the local medical society is required for admission to specialty board examinations, and that this gives organized medicine a control over those most likely to be potential price cutters, the young physicians establishing practices.

[2]Not all plans reimburse the hospital on the basis of cost, but the majority do. With the advent of Medicare, over 80-85% of the patients in the Eastern United States will be paid for on a cost basis. See Herman M. and Anne R. Somers, Medicare and the Hospitals; Washington: The Brookings Institution, 1967, pp. 155-158.

[3]Kenneth Arrow, "Uncertainty and the Welfare Economics of Medical Care," American Economic Review, 53:5, December 1963, p. 957. Price elasticity for a profit-maximizing monopolist must be equal to or greater than one (in absolute value). Although Arrow presents no evidence that the price elasticities facing a particular physician are low, we believe the demand curve faced by the individual physician differs little from the industry demand curve. See below.

the intersection of demand and supply curves.[1] Andersen and Anderson wrote in 1967, "The expenditure and use patterns are, accordingly, the results of a more or less spontaneous play of supply and demand forces. . . ."[2] Klarman notes that "authoritative opinion, supported by some facts, holds that a sliding scale of fees is not so widely applied today as formerly."[3]

Since the question appears to be unsettled, it seems worthwhile to examine the evidence to see if the market can be characterized as monopolistic or competitive. Knowledge of market characteristics is fundamental to good public policy in the area. It is also important for the proper specification of an econometric model of the medical care sector. We first consider what might be said about the question a priori and then present some empirical evidence.

The market for physicians' services has special features which set it apart from more traditional markets.[4] Prominent among these features is consumer ignorance about price and about the product. We believe that consumer ignorance introduces a significant monopolistic element into the market. Since medical ethics frown upon advertising, and physician services are used relatively infrequently, the consumer is usually ignorant about prices charged by various physicians. Further, he is hampered in learning from the experience of others, since the physician provides a wide variety of services, thus reducing the probability that a patient can easily find comparable prices. This is one aspect of consumer ignorance. Another is that the consumer often lacks the ability to judge which physician produces a higher quality product. For lack

---

[1] Joseph Gabarino, "Price Behavior and Productivity in the Medical Market," Industrial and Labor Relations Review, 13:1, October 1959, pp. 3-15.

[2] Ronald Andersen and Odin W. Anderson, A Decade of Health Services, Chicago: University of Chicago Press, 1967, pp. 148, 149.

[3] Klarman, op.cit., p. 22. Klarman cites Joseph Gabarino, Health Plans and Collective Bargaining (1960) and Somers and Somers, Doctors, Patients, and Health Insurance (1961) as evidence.

[4] Joseph P. Newhouse, "Toward a Rational Allocation of Medical Care Resources," unpublished Ph.D. dissertation, Department of Economics, Harvard University, 1968, Chs. 2-4 and Klarman, op.cit., Chs. 2, 4.

of other information he may partially judge quality by price.[1] For both these reasons, physicians who lower prices stand to gain few patients. That is, the cross-elasticity of demand between any two physicians is likely to be low, since consumers are unlikely to know about price differences, and if they do, may treat them as reflecting differences in the quality of care. That raises the question of what the mechanism is which distributes patients among physicians. r view is that the mechanism has a large random component. Patient loads are equalized to some extent, however, by the queueing time necessary to use any particular physician. If a certain physician would randomly receive a large patient load, some patients may change to a relatively less utilized physician. Further, the physician's location, his manner, and other amenities surely influence patient choice of physician. Price, however, is unlikely to play a large role.

Hence, the mechanism for insuring that price equals average cost in the long run in a competitive market is not present in this market. A physician who charges his patients a monopolistic price is not likely to be effectively undersold. Because of low cross-elasticity of demand, each physician can act like a monopolist toward those patients who choose to use him.[2] In effect, the "firm" demand curve (or the demand curve faced by the individual physician) is very nearly equal to the "industry" demand curve. Our hypothesis, therefore, is that the market for physicians' services is monopolistic although we do not attem to distinguish simple and discriminating monopoly.

A partial test of this hypothesis is the following: if physicians are discriminating monopolists, price per visit should increase with income. Data gathered by the National Health Survey show that the

---

[1] Andre Gabor and C. W. J. Granger have recently presented evidence that consumers do not purchase goods below a certain price level because their quality is suspect. This leads to an upward sloping demand curve at low levels of price. In the case of physicians, the curve might be upward sloping over the relevant range. See Gabor and Granger, "Price as an Indicator of Quality: Report of an Enquiry," Economica, 33, February 1966, pp. 43-70.

[2] It is well known that low cross-elasticity of demand is a necessary condition for monopoly to exist. See, for example, George Stigler, The Theory of Price, 3rd Edition, New York: The Macmillan Company, 1966, p. 198.

average expenditure per visit does increase with income. The figures are:[1]

Table 1

Income Class	Physician Expenditures	Physician Visits	Average Expenditure per Visit
Less than $2000	$36	4.3	$ 8.37
$2000-$3999	38	4.3	8.84
$4000-$6999	41	4.5	9.11
$7000-$9999	46	4.7	9.79
Over $10,000	60	5.1	11.76

Similar figures are available for dentists. If Kessel's explanation for monopolistic pricing (namely American Medical Association sanctions) is correct, they should be less able to discriminate, since the sanctions are not readily available to them. The figures for dentists are:[2]

Income Class	Dental Expenditures	Dentist Visits	Average Expenditure per Visit
Less than $2000	$ 9	.8	$11.25
$2000-$3999	11	.9	12.22
$4000-$6999	16	1.4	11.43
$7000-$9999	24	1.9	12.63
Over $10,000	37	2.8	12.50

It is clear that the association between expenditure per visit and income is much less marked for dentists than physicians. Rimlinger and Steele cite similar evidence from earlier surveys of expenditures on physicians in support of their assertion that physicians are discriminating monopolists.[3]

---

[1]The expenditure data are from "Personal Health Expenses," Public Health Service Publication No. 1000, Series 10, Number 27; Washington: GPO, 1966 and the visit data from "Volume of Physician Visits," ibid., Series 10, Number 18; Washington: GPO, 1965. The expenditure data were gathered from July 1962 to December 1962 and the visit data from July 1963 to June 1964. This discrepancy would only cause error if either series changed and the change were not proportional across income groups.

[2]The expenditure data are from "Personal Health Expenses," op.cit., and the visit data from "Volume of Dental Visits," ibid., Series 10, Number 23; Washington: GPO, 1965. The dental visits data were also gathered from July 1963 to June 1964 so that the same discrepancy exists as was cited in footnote 1, above.

[3]Rimlinger and Steele, op.cit. They are not concerned about the market for dental services.

Although this test supports our hypothesis, we do not believe it is a powerful one. It is probable that the quality of care changes as one's income increases. For example, the higher income patient may utilize higher priced specialists' services.[1] Also the physician may spend more time and order more ancillary services (e.g., laboratory tests and X-rays) when treating a higher income patient. Further, for technological reasons quality may vary more for physician services than dentist services. Hence, differences in price among income levels may only reflect quality differences. Thus, another hypothesis is equally consistent with these data. To characterize this market as monopolistic or competitive we shall have to rely upon indirect inferences which economic theory provides, as well as attempting to control for quality of services provided.

Our tests are based upon inferences from two alternative models of the market for physician services. The first model is that of a monopoly, and is the model which the foregoing discussion of the market leads us to formulate. In the second model price is set by the intersection of supply and demand curves, as in a competitive market.

Suppose the demand curve of the representative consumer in area i is:

1) $q_d = a - bp + cy + e$, where q_d is quantity demanded, p is price, y is income, a, b, and c are constants, and e is a randomly distributed error term. q_d and y are in per capita terms. If the cost function is also linear, the price a profit-maximizing simple monopolist will charge is:

2) $p = (a + cy + bd)/2b$, where d is marginal cost (assumed constant). This model, a model of simple monopoly, will be known as Model I. If we assumed discriminating monopoly, the empirical measures of

[1] Andersen and Anderson, op.cit., p. 16. Note that the specialist-general practitioner distinction is one piece of information the consumer has in judging quality, but this does not help him in judging the merits of individual specialists or general practitioners. Hence, cross-elasticity of demand between specialists as between general practitioners is still likely to be low.

price would be ambiguous and non-linearities would be introduced.[1] To avoid complexity, therefore, we continue to work with an analytical model based on simple monopoly.

There is no variable in Model I for the number of practitioners. This is a consequence of the assumption that each physician is a monopolist. The model would also apply if physicians were a cartel, since the short-run profit-maximizing price for a cartel is independent of the number of firms.[2]

In a competitive model there must be a supply curve. Suppose the supply of physician services per representative consumer in area i is a linear function of price and the number of physicians in area i. Price is included because it may affect the number of hours which the existing stock of physicians is willing to work (either positively or negatively) and it may affect the number of minutes a physician is willing to devote to any individual visit. In symbols, this supply curve is:

---

[1] The theory for a discriminating monopolist can be developed as follows: Suppose the demand curve faced by the discriminating monopolist is $q_d = a - bp + cy$. He then produces to where his marginal cost d, intersects the demand curve. Suppose it intersects the demand curve at q_o. Taking the inverse of the demand curve, $p = \frac{1}{b}(a - q + cy)$, the monopolist receives the area under the demand curve, or $\int_0^{q_o} \frac{1}{b}(a - q + cy)\,dq = \frac{1}{b}(aq_o - \frac{q_o^2}{2} + cyq_o)$. Since q_o is a function of y, income centers non-linearly. For example, suppose $d = 0$. Then $q_o = a + cy$ and the amount received by the physician is $\frac{1}{b}(a^2 + acy - \frac{(a^2 + 2acy + c^2y^2)}{2} + acy + c^2y^2) = \frac{1}{2b}(a^2 + 2acy + c^2y^2) = \frac{(a + cy)^2}{2b}$.

[2] The short-run maximizing price for a cartel is not, however, independent of the distribution of firms with respect to costs. If this model were to be a test of Kessel's assumptions, we would need to make the additional assumption that this distribution did not vary across areas.

3) $q_s = f + gp + hn + u$, where q_s is quantity supplied per person, n is the number of physicians per person, f, g, and h are constants, and u is a randomly distributed error term. We do not make any assumptions about the sign of g, but do assume that the number of physicians in area i in year j is independent of q_d in that year (though not necessarily independent of q_d in area i in year j - 1).[1] This assumption, which is important to the argument, is based on the observation that physicians, once having established a practice, will face high moving costs. Thus, if n in area i is to increase, the increase must come mostly from recent medical school graduates. But these are only 3-4% of total physicians.[2] Hence we take physicians in area i in year j to be a predetermined variable. If we assume the market clears, so that:

4) $q_s = q_d$, we can solve equations 1, 3, and 4 for the reduced form equation for price. The reduced form equation is:

5) $p = (a - f + cy - hn + e - u)/(c + g)$.

If the supply curve has a positive slope, c + g will be positive, so that the partial derivative of price with respect to income in equation 5 is positive and with respect to the number of physicians is negative. In any event, if c and h are both positive in the structural equations 1 and 3, one derivative is necessarily positive and the other negative in the reduced form equation. This model of competitive pricing we call Model II.

Data on general practitioner office visit prices and the number of general practitioners are available for 1966, and data on per capita income are available for 1965 for 18 cities.[3] p and y were deflated by

[1] Years are used because our data are annual data.

[2] Computed from United States Department of the Census, Statistical Abstract, 1967; Washington: GPO, 1967.

[3] Data sources and dates of measurement are given in the appendix.

the Consumer Price Index for each area. When equation 2 (Model I) was estimated from these data, the results were:

$$p = 0.3 + \underset{(0.7)^{**}}{2.2y} \qquad R^2 = 0.41.$$ [1]

Thus, the prediction of Model I is corroborated by these data. But the partial correlation of n with p is +0.55, which is strong evidence against Model II.[2] If Model II were correct, the sign of the partial correlation coefficient should be negative. That is, since c/(c + q) is positive, h/(c + q) should be negative.

Similar results appear when Models I and II are applied to the market for dental services. Data on prices charged for tooth fillings are available for 18 cities in 1961, and income data can be found in the 1960 census. No data on the number of dentists by city were found, but the 1961 dentist/population ratios are available for the counties in which the eighteen cities are located. Treating that ratio as n, and again deflating price and income by the Consumer Price Index, our estimate of equation 2 (Model I) for dentists is:

$$p = -3.2 + \underset{(1.0)^{**}}{4.1} \text{ Income per Capita} \qquad R^2 = 0.54.$$

The partial correlation coefficient of n with p is small but positive, +0.13, which is again evidence against Model II.[3] Thus, the market for dental services can also be characterized as monopolistic. If dentists do not differ from physicians in this respect, it is probably something other than American Medical Association sanctions which leads to monopoly in the market for physicians' services. Since consumers are likely to be almost as ignorant about dental services as physician services, the consumer ignorance argument can explain the results.

Though we believe these results to be rather striking, there is additional evidence against Model II. Suppose Model II were correct,

---

[1] ** will be used to indicate significance at the 0.5% level (one-tail test) and * at the 2.5% level (one-tail test).

[2] If entered, n would be significant at the 1% level using a two-tail test.

[3] If entered, n would be insignificant at a 50% confidence level using a two-tail test.

but there were a dynamic disequilibrium, in which income and thus demand increased relatively rapidly in some areas. Since supply does not immediately adjust, price would rise to clear the market. First differences are correlated definitionally with levels, and it may be that correlation between the first differences of income and price is responsible for correlation between the levels reported above. This explanation cannot satisfactorily explain the positive partial correlation of n and p, but if it is correct, there ought to be a close association between the first differences of price and income, perhaps even closer than between the levels. If Model I is correct, there may be a weak association, if any, between these variables. Although a change in income raises demand, physicians, if they act as monopolists, may treat the change as transitory or they may simply be slow to react to demand changes. Therefore, we have regressed the change in price (in real terms) from 1961 to 1966 on the change in income from 1960 to 1965. (These dates are chosen because data for those years are readily available.)[1] This yields:

$$\text{change in } p = -4.7 + \underset{(0.7)}{0.4} \text{ change in } y \qquad R^2 = 0.02$$

As can readily be seen the association is much weaker than the association between the levels, and so is further evidence in favor of Model I.

Although we can find no data on the distribution of physicians for 1961, we can test Model I further by using 1961 price and income data. As measures of price we have used the customary charge for a general

---

[1] What evidence there is on the speed of convergence to equilibrium physician supply indicates that little of the adjustment is accomplished within five years. L. Benham, A. Maurizi, and M. Reder, "Migration, Location, and Remuneration of Medical Personnel: Physicians and Dentists," Review of Economics and Statistics, 50:3, August 1968, pp. 332-347, find no relationship between changes in per capita income and changes in the physician/population ratio for consecutive ten-year periods beginning in 1930 and ending in 1960. This implies the lag is infinite. Martin S. Feldstein, "An Aggregate Planning Model of the Health Care Sector," Medical Care, 5:6, November-December 1967, pp. 369-381, finds that specialist/population and general practitioner/population do adjust to changes in the percent of families with incomes less than $3,000, but that only around 15% of the adjustment is accomplished within five years. These figures are quite crude econometrically, and are cited only because they are consistent with plausible a priori notions.

practitioner office visit as well as four well-defined procedures: an obstetrical case; an appendectomy, a tonsillectomy; and a tooth filling. Although obstetrical cases, appendectomies, and tonsillectomies may be done by either a specialist or a non-specialist, the sample of prices attempts to adjust for this.[1] Thus, we attempt to control for the higher prices a specialist may charge. Second, we have included two variables which are designed to be proxies for certain dimensions of quality of care. These variables come from research on cross-sectional variation in mortality and morbidity rates.[2] Several demographic, economic, and medical characteristics of an area were used to explain these rates. Making the assumption that the residual variation in these rates can be attributed to the quality of care rendered in a given area, we have used the residuals from equations explaining variation in mortality due to cardiovascular disease and infant mortality as independent variables.

It is unclear what the relevant geographical market is for physicians' services. It could be the city or the standard metropolitan statistical area (SMSA) or an even broader area. We have used data on the independent variables from both cities and SMSA's to see which have more explanatory power.

Data on price are available for 20 of the largest cities for 1955 and 1961 and for 39 cities for 1966.[3] We have excluded the 1955 data because of probable measurement error and because it is difficult to obtain data on the independent variables for that year.[4] Two of the

---

[1] See United States Department of Labor, Bureau of Labor Statistics, "The Consumer Price Index, Technical Notes," Bulletin 1554, Washington: GPO, 1967, p. 4.

[2] Newhouse, op.cit.

[3] But for 1966 only data from SMSA's are available for the independent variables.

[4] For 1966, the data are in the form of expenditure by city workers on physicians' services. Expenditure is defined as 13.1 x General Practitioner Office Visit Price + 0.6 x General Practitioner Home Visit Price. We have multiplied the resulting figure by 0.06778 to obtain an approximation to the office visit price. The figure 0.06778 =

$$\frac{1}{\left(13.1 + \left(\frac{0.6 \text{ Unweighted Average of GP Home Visit Price in 20 Cities } 61}{\text{Unweighted Average of GP Office Visit Price in 20 Cities 1961}}\right)\right)}$$

1961 observations and seven of the 1966 observations have been excluded because of a lack of data on the independent variables. Data sources and dates of measurement are listed in the Appendix.

The results are partially listed in Tables 2 and 3. They are consistent with Model I as a characterization of both physician and dentist pricing, since the income variable is consistently quite significant.

The quality variables are never significant at the 5% level, but in all eight cases of physician pricing their partial correlation coefficients have the correct (negative) sign, given that income is in the equation. This has only a 1/256 chance of happening, if the probability of a negative sign is 0.5, and so would indicate that part of the price difference among areas may be due to quality variation. Although the partial correlation of the cardiovascular residuals with tooth filling prices is negative, the partial correlation of the infant mortality residuals (with income only in the equation) is positive. Thus, the price variation reported in Table 1 for physicians' services may be due to quality change rather than pure price discrimination, and quality variation may not be as important in the market for dental services as in the market for physician services. The insignificance of the quality variables in Table 2 almost surely stems from measurement error. Inclusion of the quality variables, however, changes the coefficient of income little as can be seen by an inspection of Table 2. The results using city data are uniformly much better than those using SMSA data. Hence, only the results using city data are presented.

Unfortunately, the results in Tables 2 and 3 do not assist in answering the question whether monopolistic pricing is simple or discriminatory. The question is important both for its welfare implications and if income elasticities are to be estimated using expenditure data, but the answer will have to await data on charges made to individual patients.[1]

[1]The welfare implications of discriminating monopoly for physician services are not clear. On the assumption of continuous utility functions, it can be shown that discriminating monopoly creates a situation where mutually beneficial trades are possible and hence is not efficient.

Table 2

18 CITIES--REAL PRICE AND INCOME-1961

General Practitioner Price for an Office Visit = 0.9 + 1.8 Income per Capita $R^2 = 0.56$.
(0.4)**

General Practitioner Price for an Office Visit = 0.9 + 1.8 Income per Capita - 0.3 Cardiovascular Residuals - 0.01 Infant Residuals $R^2 = 0.58$.
(0.5)** (0.4) (0.1)

Obstetrical Case Price = 51.7 + 59.2 Income per Capita $R^2 = 0.24$.
(26.4)*

Obstetrical Case Price = 31.1 + 69.2 Income per Capita - 39.5 Cardiovascular Residuals + 4.8 Infant Residuals $R^2 = 0.34$. (See Note 1).
(29.2)* (26.8) (7.8)

Appendectomy Price = 9.4 + 75.5 Income per Capita $R^2 = 0.50$.
(18.8)**

Appendectomy Price = 27.8 + 66.3 Income per Capita - 0.09 Cardiovascular Residuals - 6.1 Infant Residuals $R^2 = 0.55$.
(21.3)** (19.5) (5.7)

Tonsillectomy Price = 20.6 + 26.7 Income per Capita $R^2 = 0.32$.
(9.7)**

Tonsillectomy Price = 21.4 + 26.3 Income per Capita - 8.4 Cardiovascular Residuals - 0.7 Infant Residuals $R^2 = 0.37$.
(11.1)* (10.2) (3.0)

Tooth Filling Price = -3.2 + 4.1 Income per Capita $R^2 = 0.54$.
(1.0)**

Tooth Filling Price = -4.3 + 4.7 Income per Capita - 1.4 Cardiovascular Residuals + 0.3 Infant Residuals $R^2 = 0.60$.
(1.1)** (1.0) (0.3)

Note 1: The partial correlation of the infant residuals variable if the cardiovascular residuals variable is excluded is negative.

Table 3

32 CITIES--MONEY PRICE AND INCOME-1966

General Practitioner Price for an Office Visit = 3.7 + 1.0
(0.4)*

Income per Capita $R^2 = 0.14$.

It is interesting to compute the elasticities of the various prices with respect to income. For a monopolist facing the demand curve shown in equation 1 with constant marginal cost, such an elasticity is 1/2 (income elasticity of demand/price elasticity of demand)[1] The elasticities of price with respect to income computed at the means are shown in Table 4. Other estimates using household data of the income elasticity/price elasticity ratio for physician visits have placed this ratio around 3 or higher, so that the results in Table 4 seem low by a factor of about 2.[2] Considering the small size of our sample, the aggregate nature of our data, and the simplifying assumptions in our model, this error in a point estimate is understandable. However, the results do indicate that the responsiveness of price to income is markedly higher for dental services. Little, if anything, is known about the price elasticity of demand for dental services, but

---

The argument is essentially that the poor man equates his marginal rate of substitution between medical care and a numeraire good with this price ratio. Hence, he would be better off if he could trade his last unit of medical care to the rich man for more than the price paid for it. Say the poor man paid $5, and the rich man offers him $10. For $5 the poor man could buy enough of the numeraire good to leave him equally well off and still have $5 left. If the rich man is charged any price greater than $5, the possibility of a beneficial trade exists. The problem with this argument is the assumption of continuous utility functions. Suppose the service in question is a physical examination. The value to the poor man of one examination in a given time period may be considerably greater than $5, but the value of a second considerably less. In other words, the consumer may not be able to make his marginal rate of substitution between medical care and the numeraire good exactly equal to their price ratio. In this case there may be no welfare loss from discriminating monopoly.

[1] Income elasticity from equation 1 equals cy/q, while price elasticity equals bp/q. Using equation 2 the elasticity of price with respect to income equals cy/2bp.

[2] Paul J. Feldstein and R. M. Severson, "The Demand for Medical Care," in American Medical Association, Report of the Commission on the Cost of Medical Care; Chicago: American Medical Association, 1964, Vol. I, pp. 75-76.

Table 4

"INCOME ELASTICITIES"--18 CITIES--1961

Price	"Income Elasticity"
Office Visit to a General Practitioner 1961	0.8
Office Visit to a General Practitioner 1966	0.9
Obstetrical Case	0.7
Appendectomy	0.9
Tonsillectomy	0.7
Tooth Filling	1.6

others have estimated the income elasticity of demand for dental services to be considerably higher than for physician services.[1] Thus, unless price elasticity of demand for dental services is also considerably higher, the results in Table 4 are qualitatively consistent with what is known about the relative income elasticities of physician and dental services.

Another question which may be asked of these data is whether physicians are profit-maximizers. An answer to this question as well as further evidence in favor of the hypothesis of monopoly is provided by including variables which other studies have indicated influence demand.[2] Such variables are: the percent of the population over 65 years of age; the percent of the population with hospital or surgical insurance; the percent of the population with a high school education; and the percent of population change from 1950 to 1960 (since supply does not immediately adjust, this changes demand per physician). These variables, when included, are never significant. Furthermore, they often have the "wrong" sign. This could be because the sample is small and the variables intercorrelated. More likely, it is because physicians do not fully maximize profits, but do charge higher prices when income raises demand. Physicians may fear the political consequences of maximizing profits in the short run, so that the observed prices are long-run profit maximizing prices. Alternatively, they may be satificers rather than maximizers. That physicians are not short-run profit maximizers is consistent with Arrow's observation about price elasticity. Note that the insignificance of these variables, if it is due to a real lack of association rather than a lack of independent variation in the sample, provides an inference that the monopoly hypothesis is correct.

---

[1] On the observed higher income elasticity of demand for dental services, see Klarman, op.cit., p. 26, Feldstein and Severson, op.cit., and Andersen and Anderson, op.cit., pp. 29, 46, 47. Estimated income elasticities are obscured by possible price discrimination if expenditure data are used. Andersen and Anderson, however, find higher income elasticities for dental services using data in physical units.

[2] For a survey of demand studies see Paul J. Feldstein, "Research on the Demand for Health Services," Millbank Memorial Fund Quarterly, October 1966, pp. 128-65 and Klarman, op.cit., ch. 2.

If the market were competitive, price would be higher in areas with higher demand, provided supply curves have a positive slope.[1] If physicians are monopolists, price is necessarily higher in areas with higher demand only if physicians are short-run profit maximizers.

One explanation for the rapid increase in physician fees after the passage of the Medicare and Medicaid legislation is that the legislation shifted the demand curve physicians faced outwards.[2,3] This factor may account for much of the rise.[4] However, if physicians are monopolists, but are not short-run profit maximizers, there is an additional explanation for the price increase. Physicians may be less reluctant to charge the government a fee closer to their short-run profit maximizing fee than they were to charge aged patients who paid their own bill.

CONCLUSION

Although our tests are relatively weak because of the small number of observations, they all accord with a priori expectations in indicating that the market for physicians' services is monopolistic rather than competitive. This result also appears to hold in the market for

---

[1] If supply curves do not have a positive slope, the positive associations between income and price are most difficult to explain using competitive assumptions.

[2] Physicians' fees rose at 2.8% per year from December 1960 to December 1965, but 7.0% per year from December 1965 to December 1967. (William F. Berry and James C. Daugherty, "A Closer look at Rising Medical Costs," Monthly Labor Review, 91:11, November 1968, p. 2). It should be noted, however, that the entire CPI also more than doubled its rate of price increase; in the earlier period it increased at 1.3% per year and in the later period at 2.8%. The Medicare legislation took effect on July 1, 1966, although it was signed into law on July 30, 1965. It is quite possible that physicians, who realized that reimbursement was to be made on the basis of customary charges, made anticipatory price increases before July 1966.

[3] For this explanation see Somers and Somers, op.cit., pp. 259-60 and "Medicare and Medical Inflation," Hospital Practice, 3:11, November 1968, pp. 23-32.

[4] Visits by the over 65 age group are 12.9% of total physician visits, and visits by under 65 with incomes under $3000 are another 9.3% of total visits. (Public Health Service, "Volume of Physician Visits, July 1966-June 1967" Washington: GPO, 1968).

dentists' services. Consumer ignorance about price and quality which leads to low cross elasticities of demand is therefore a more likely explanation than collusion by the American Medical Association. If this explanation is correct, the system is inherently monopolistic, since competitive forces of the marketplace cannot readily drive price down to average cost. Nevertheless, there is some evidence that physicians do not maximize short-run profits, since price does not vary with age, education, or insurance variables. The relevant geographical market for physicians' and dentists' services appears to be the city rather than the SMSA. Part of the price difference among cities may be due to variation in the quality of care, although it is difficult to say how much of the difference in price can be attributed to quality variation.

Appendix

DATA SOURCES AND DATES OF MEASUREMENT

Physician Prices, 1961: United States Bureau of the Census, Statistical Abstract, 1963; Washington: GPO, 1963, p. 363.

Price and Income Deflators; ibid., pp. 357, 358.

Physician Prices, 1966: "City Worker's Family Budget," United States Department of Labor Bulletin 1570-1; Washington: GPO, 1967, pp. 9-12.

Number of Physicians 1966: Christ Theodore and Gerald Sutter, "Distribution of Physicians, Hospitals, and Hospital Beds in the U.S.," Chicago: American Medical Association, 1966.

Number of Dentists 1961: American Dental Association, "Distribution of Dentists in the United States by State, Region, District, and County," Chicago: American Dental Association, 1962.

Income in 1959 of the population in 1960, population in 1960, % of population with income under $3,000 in 1960, population change 1950-1960, % of population over 65 years of age in 1960, % of population over 25 with a high school education in 1960: All from United States Bureau of the Census, County and City Data Book, 1967; Washington: GPO, 1967 (1960 Census data).

Income in 1965: United States Internal Revenue Service, Statistics of Income 1965; Washington: GPO, 1966.

Percent of population with hospital insurance coverage: United States Public Health Service, "Health Insurance Coverage," July 1962-June 1963. (Publication No. 1000, Series 10, No. 11); Washington: GPO, 196[illegible]

Mortality Residuals: from equations computed in Joseph P. Newhouse, "Toward a Rational Allocation of Medical Care Resources," unpublished Ph.D. Dissertation, Harvard University, 1968.