RICE UNIVERSITY

ECONOMICS OF ALTERNATIVE PHYSICIAN REMUNERATION SYSTEMS

by

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ABSTRACT

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In this thesis the nature of the market for physicians' services has been examined and the implications of its characteristics have been analyzed for the three basic systems of payment: fee-for-service, capitation, and salary. Because of the fact that the services provided are not homogeneous, the presence of external economies, and the informational inequality between patient and doctor, the market diverges significantly from that of the perfectly competitive model.

A model was developed for the determination of the physician's equilibrium income under a fee-for-service system. Further analysis showed that the doctor will act as a market divider and will practice price discrimination among individual patients in the specialist market. His ability to affect the level of demand for his services leads to the greatest increase in his welfare when he performs inefficiently with respect to society as a whole, performing only those services whose price is greater than his estimate of the satisfaction he would derive in the future if the service were not performed. As a result, the price will increase and this price increase will spread through the system as a whole. The physician will innovate if and only if the cost of innovation is less than or equal to the expected increase in his income minus the amount of income necessary to compensate for the expected increase in disutility involved. If a third party provides part or all of the remuneration, the effects of the doctor's ability to induce demand are greatly magnified.
A second model was developed to show the physician's equilibrium income under a capitation system. In this system, the quantity of services demanded is only minimally related to the price, and the doctor's marginal revenue for performing any given service is zero with respect to the present income period and patient list. Some limits must be set on the patients' ability to change doctors. Pressure also arises for a classification of patients and graduated levels of capitation payments; the system tends to become more closely related to a fee-for-service system. In addition, some patients must be assigned to physicians, and enforcement of minimum standards of care may be necessary if competition among doctors is weak. Referral of patients and use of related health facilities will be encouraged unless specific limits are placed upon them.

Finally, the salaried system was analyzed in relationship to the capitation and fee-for-service systems. The salaried system alone necessarily involves an employer-employee relationship, and development of bargaining strength becomes the dominant financial goal of the doctor. His ability to induce demand will be used as it was in the capitation system. The incentive to utilize related services, to perform research, to innovate, and, indeed, to perform with respect to almost all other criteria will depend upon the emphasis placed upon these items by the employer. Because of differences in the perspectives of the physician, the third party, and the patient, a salaried system implies the need for machinery to resolve differences among the three perspectives.

The three systems were then compared with respect to the risks and the accounting costs involved. For the physician, the level of total
income becomes more certain with prepayment of fees, still more so with capitation payments, and most of all with a salary. In contrast, as this becomes more certain, uncertainty as to the amount of disutility undergone for any particular level of income is increased. Minimal accounting costs are incurred in a salaried system, and these costs increase for capitation, and especially for fee-for-service. Total cost may be made predictable within each system, but only with greater administrative costs in the capitation and especially the fee-for-service systems.
I wish to express my grateful appreciation to Dr. Gaston V. Rimlinger, whose advice and concern have been indispensable to me. I wish also to express my gratitude to the Ford Foundation, whose financial aid has made my graduate studies possible.
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I. INTRODUCTION

With the accelerating growth of medical science and technology, the economics of medical care has become the subject of much research, and the literature available is growing at a rapid pace. For the most part, however, this literature has dealt with description and statistical analysis of some of the more prominent instances of various experiments in organizing and paying for medical care. Notable for its scarcity, however, is treatment of the problems in a theoretical manner.

This thesis attempts a theoretical treatment of one special area of medical care: physicians' services. Although the area is only one in the vast complex that modern medical care has become, it is a central one. In addition to his role in providing direct services which benefit the patient, it is the physician who chooses the exact composition of medical products and services used in providing a treatment in response to the patients' demands for care. Thus viewed, he is in a sense the "producer" who combines the many "factors of production" in attempting to meet the demands of the consumers. The method of payment of the physician, because it is felt to affect the actions he takes in the above role, is the subject of great controversy in many countries today and an increasingly important political issue in the United States today.

Chapter II of this paper, "The Market for Physicians' Services," is devoted to a description of some of the special attributes of physicians' services and their implications for the use of the competitive

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model. Included are discussions of several concepts which provide the basis for the analysis which follows.

Chapters III, IV, and V are devoted to analyses of the three basic systems of payment: fee-for-service, capitation, and salary. The former two are essentially situations of self-employment, and similar models have been developed for the analysis of the implications of the special features of physicians' services in each of these cases. Remuneration by salary implies a very different sort of situation — one in which the physician has much less freedom in determining the number of hours he works and the level of income he derives from his practice. The special problems of the salaried physician and his employer and the implications of these problems are discussed in relation to the preceding two chapters. As there has been little or no theoretical discussion of the economics of self-employment or of the problems involved in the determination of salaries (as opposed to wages), the models presented offer solutions to little-explored problems.

In practice, fee-for-service, capitation, and salaried services are modified in varying degrees from the pure cases which occupy the major part of these analyses, the reasons for many of these modifications being demonstrated by the analyses of the pure cases. In addition, combinations of the various systems are possible in great number, as for example in the payment of a basic salary supplemented by a capitation fee, or the payment of a salary with additional fees for specific services. In such situations, the same forces will be at play as those
discussed in the "pure" cases.

The final chapter of this paper is devoted to long-run effects of the three systems and to their accounting and administrative costs, followed by a recapitulation of the conclusions reached in the earlier chapters.
II. THE MARKET FOR PHYSICIANS' SERVICES

The assumptions and welfare implications of pure competition

Under static assumptions, pure competition in the market for a good means that the price is a datum for each consumer and each producer. In equilibrium each household in the economy is buying that basket of goods which maximizes its satisfaction; or, in other words, the marginal rate of substitution between any two products is equal to the ratio of their prices. In addition, each firm is selling that amount of the product which maximizes its net revenue (which must be non-negative in the long run); or, alternatively, the marginal cost of production equals the equilibrium price, and the marginal rate of technical substitution between any two of the productive services used to produce the equilibrium quantity equals the reciprocal of their prices. Thus, efficient use of resources in producing the good is achieved, as is optimal distribution of the good, given tastes, planned expenditures, prices of other goods, the production possibilities and supply conditions of productive services.

The assumptions necessary for pure competition in the market for a good are four in number:

1. The number of sellers of the good must be so large that the quantity which each seller offers for sale is so small a proportion of the total quantity offered for sale that each seller is incapable of affecting the price of the good by altering the quantity he offers for sale. Analogously, the number of buyers of the product must be so
large that the planned purchases of each buyer at each price are so small a proportion of total planned purchases at that price that no buyer can affect the price of the good by altering the amount of his planned purchases.

2. The product must be homogeneous; that is to say, each buyer must be indifferent as to which unit of a seller's product he buys as well as to which seller he buys from, and the same condition must hold for sellers in relation to buyers and their purchases.

3. Each buyer, acting independently, tries to maximize his satisfaction within the limits of his income and wealth; and each seller, acting independently, attempts to maximize his net revenue.

4. Each buyer has complete knowledge of his tastes, the prices of all products, and the relative capacity of each product to satisfy his desires. Each seller has full knowledge of the quantity of the product which is in fact obtained from any possible combination of the relevant productive services and of the prices of these productive services.¹

The fulfillment of these four conditions necessary for pure competition will equate the amount supplied and the amount demanded in the market in such a way as to generate an efficient allocation of resources within the industry and an optimal distribution of that quantity of the good which is produced. In the next section, the economic nature of physicians' services will be examined, and it will

be shown in what ways and to what extent the nature of the product precludes the operation of pure competition in the market for physicians' services.

The economic nature of physicians' services.

There are elements of the nature of physicians' services which strongly contradict the assumptions of pure competition. While the efforts of the physicians and patients to compensate for these elements can bring into existence still further deviations from the assumptions of the competitive model, these latter are not of interest to us in this section of the study. Thus, for example, we shall be concerned in this chapter with the fundamental gulf in knowledge between patient and doctor. But as a result of this inequality, patients often take good manners for competence, and the doctor may find himself confronting a trade-off problem if good manners are costly in terms of time. However, this trade-off problem will not be fully discussed in this chapter because it stems from the fundamental problem of the inequality of knowledge between physician and patient. Here the concern is solely with those contradictions derived from the very nature of physicians' services.

Physicians' services may be defined as the application of the knowledge and technology of medical science to the individual requirements of the patient. We may benefit in understanding the nature of
this "product" by comparing it with the analogous case of education. What is sold is not a cure for disease any more than a teacher sells the secrets of the universe (although in either case some sellers may pretend to do so). This point deserves emphasis, for it is essential to the understanding of the problems associated with medical care. Pursuing the analogy to education, teaching services must be distinguished from the complementary product of research and from other products or services which interact with teaching services, such as nutrition, printed materials, housing facilities, etc. Likewise, it is necessary to differentiate between physicians' services and the complementary product of medical research as well as other products which interact with physicians' services, such as education, sanitary facilities, clothing, shelter, etc. While these are of very great importance in determining the state of health of the individual and may have significant effects upon the demand for physicians' services, factors relating to these products are taken as given in this analysis.

The most obvious characteristics of our "product" is that it is a service rather than a good. This fact means that there is no separate production process, no finished good which may be appraised by the buyer before purchase, and the service cannot be stored by either buyer or seller. The last attribute means that both the supply and the demand will be less elastic in the short run than would otherwise be the case. The great amount of knowledge required of the doctor also means that a
long period of training is necessary. It is difficult to change one's specialty, and there are rigidities in supply over relatively long periods of time.

The role of knowledge in medical care is fundamental and gives rise to many problems. The service offered for sale is in essence a combination of the component factors of 1) the ability required of the physician, 2) his physical skill, 3) the time necessary for rendering the services, and 4) the services of physical equipment, all four of which are to be applied to the doctor's knowledge of the patient. In different areas of medical care, the importance of each of the four components varies. However, in all cases both the mental resources required and the doctor's ability to provide them are susceptible to only very inexact evaluation by the patient. From this fact many of the special problems in studying physicians' services arise. There are many gradations of medical knowledge, from everyday common sense to that of the specialist, and the use of the incorrect level of knowledge represents a misallocation of resources. The ability of the physician to provide the mental resources needed likewise cannot be determined by the purchaser, although there exist some guidelines he can follow. An additional basis for evaluation can be obtained by consulting others in the medical field, but this represents a waste of resources unless the combined efforts of more than one supplier lead

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2 In my emphasis upon the role of knowledge, I follow the basic analysis of Arrow, Kenneth J., "Uncertainty and the Welfare Economics of Medical Care," American Economic Review, LIII, 5 (December, 1963), pp. 958-973.
to more effective care than could have been obtained by any one of
the doctors working separately, and even then, the extra benefit
must be no less than the extra cost. Moreover, it may still leave
unanswered the question of which of the physicians is to be considered
the authority unless definite proof can be cited (and this in a field
where there often exists no single correct answer or demonstrable
proof). In addition, results of any standardized tests of intelli-
gence or knowledge, where obtainable, give indications of sorts for
a given point in time, although there is no check on the retention of
the indicated abilities. The extent of formal medical training and
the quality of the institution at which it was received also give some
indication of quality, although for the evaluation of these, the
patient is largely dependent upon the consensus of the members of the
profession.

Thus the buyer cannot directly appraise either the service rendered
or that required, and indirect sources of information previous to treat-
ment are imperfect. In addition, changes in the patient's condition
after treatment are only an imperfect measure of the services rendered
so that indirect indications of the utility of the service after treat-
ment are also imperfect. Due to the imperfect state of his medical
knowledge (which is at the very least limited by the state of medical
knowledge in general) and lack of control over the variables affecting
the health of the patient, even the seller is uncertain as to the effects
of the service he provides. The supplier has some degree of control
over how much he learns of the available body of medical knowledge, which will affect the results of treatment. This body of information is rapidly changing and expanding, however, and it remains at a very tentative stage. Furthermore, the ability to obtain information concerning the patient's particular symptoms and needs is limited. While some knowledge can be obtained from observation and examination, which may be supplemented by information from others concerning the patient, some of the information must be supplied by the patient himself, and, where possible, this is in general the most efficient source of information if it is not misleading. The buyer himself is also uncertain as to the effects of the services, but his uncertainty is the result both of his medical ignorance and of his inability to judge the competence of the supplier. Due to these factors, the results of care are an inaccurate measure of the quantity and quality of the services provided. Nevertheless, in those cases where a service is more or less routinely used by the patient, results of previous care will be one of his measures of the quality of services of a given doctor. While a small degree of knowledge on the part of buyers will allow an equilibrium to be achieved in the market, that equilibrium is certainly far from the ideal of welfare economics.

We have seen that there are only limited and imperfect means available to the purchaser to evaluate physicians' services. This in effect gives the supplier a high degree of control over the demand for the very services he supplies. Indeed, one of his acknowledged functions
is providing advice about future use of physicians' services, both
his own and those of other suppliers. The dispersion of knowledge
in matters of health will affect the degree of monopoly power of the
supplier over the demand and will even eliminate the demand for some
services. (A little knowledge can be a dangerous thing, however, and
self-diagnosis and misuse of formerly prescribed treatments can cause
misallocations when incorrect diagnoses, overdoses or underdoses result
in even more serious problems and extra expenses exceed the amount saved
by not purchasing the services of a physician. In addition, a patient's
limited knowledge may cause him to misjudge a physician when some
conditions have been altered without his realizing it.)

The problem of the evaluation of the services by the purchaser has
another facet: not only is the purchaser incapable of evaluating the
efficacy of the service in fulfilling his desires, but his purchases of
it are largely based on non-economic factors, since they are in the nature
of needs, while the economic bases differ from those of most commodities.
Medical services are generally sought as a means of preventing possible
displeasure or reducing a perceived discomfort rather than as a source
of positive pleasure in themselves. The individual has little control
over the incidence of disease. When illness strikes or a strong fear
of future illness is felt, the services are viewed as a necessity, and
the demand becomes highly inelastic since the results of the services
may determine whether or not the patient will continue to live and to
what extent his abilities will remain unimpaired. In a culture in which human life on this earth is highly valued for non-economic reasons and in which a sense of compassion for or responsibility toward other men is strong, the role of purely economic considerations in determining demand is diminished and the price elasticity of demand is small. Similarly, especially in the long run, but also in the short run, the supply is also affected by the non-pecuniary rewards of the profession. These rewards include social status in the community, the intellectual reward of discovering new knowledge, and the humanitarian reward of helping other human beings.

Although the emphasis in this section has been upon the problems arising from the gap in knowledge between the purchaser and the supplier, this problem is only one of the problems associated with the market for physicians' services. Furthermore, it is a problem present in some degree in the markets for many other goods and services. In the market for physicians' services, however, it is accentuated by institutional barriers to the flow of knowledge and by the urgency and importance of the results of physicians' services to the patient.

In addition, we should note the rapid technological changes taking place in medicine today. These have been accelerated throughout the history of medicine and we can anticipate the continuation of this trend into the future. As more and more is discovered about the human organism, and as new techniques and equipment become increasingly expensive and
complex, we can expect the financial aspect to come increasingly to the fore if these discoveries are to be applied. These technological advances cause rapid shifts in the demand for medical care. The shifts in supply may far override these in areas where improved techniques are found to replace less efficient ones in care for certain problems. The area of new discoveries which add to rather than supplant old techniques are liable to cause shifts in demand without corresponding shifts in supply, or with only slight ones. It is in these areas which we may foresee the greatest problems. In addition, the increasing complexity of medical knowledge results in an even greater gap between the patient and the physician, giving the physician an even greater control over demand and heightening all of the problems associated with the gap of knowledge.

Deviations from the assumptions of pure competition

Let us first of all note that in theoretically determining the equilibrium point, we consider tastes given and planned expenditures set at a given level. But "tastes" in medical care are steady and predictable factors in expenditures on medical care only for routine services, such as periodic checkups, and in determining the type of situation in which professional medical care is sought. Given this, however, most of the demand for physicians' services is unplanned, for the incidence of disease is an uncertain thing. Therefore, demand will shift often for the individual with factors affecting his health. In the aggregate, however, this uncertainty becomes a problem only if
shifts for individuals do not compensate for each other (as in epidemics and catastrophes) and if the short-run supply of physicians' services is relatively inelastic.

At this point we shall return to the four specific assumptions introduced at the beginning of this chapter.

1. Given that all the other assumptions (most especially that of perfect knowledge of the prices of all goods on the part of the buyer) are fulfilled, there are generally sufficient numbers of physicians that the quantity offered by a single supplier of the services will not greatly affect the equilibrium price. In some market areas the population is so sparse as to prevent offering sufficient remuneration to several suppliers, but this situation is eased by decreasing cost and inconvenience of transportation and the enclosing of a wider area within a market. To the extent that only a few can profitably maintain a practice, the demand curve facing the individual supplier is more inelastic, being identified with the sum of the individual demand curves of the patients in the area with the case of only one doctor. Generally the same holds true for demand. However, we shall later see that there does exist, for the physician in particular, the ability to influence price by other means.

2. The second requirement, that the product be homogeneous is not met. Even if the actual services, the recommendations and physical treatment are comparable, the circumstances surrounding the transaction
may vary greatly. The comparative opulence or meanness of the decor and equipment of the office, its location relative to that of the patient and of other physicians, the cordiality or brusqueness of the ancillary staff, and other such conditions may affect the decision of the purchaser. In addition, the manner of the doctor himself may strongly affect the choice of the patient. For this is indeed a part of the product which is sold. The manner in which the diagnosis is conveyed to the patient as well as the techniques used in routine procedure are of great importance to him in many cases. In addition, these factors may well condition the actual results of treatment and need for future treatments, in view of the interaction between the pathological and the psychological.

3. There is much discussion of the fact that there are many instances in which doctors are motivated by other than monetary considerations. While these may be important sources of satisfaction to the supplier, for most marginal decisions time and income are the important considerations for the physician. His preferences with respect to these two factors may be shown by an indifference map. (See Graph 1.) Other factors are significant mainly in long-run situations, when the advantages and disadvantages of a career in medicine are compared to those of other vocations.

Assuming the independence of the disutility of work and the utility of income, the indifference curves which make up the indifference map will exhibit several general characteristics. They will have a positive

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GRAPH 1.

Physician's indifference map

Income

Hours of physician's services
slope because of the negative marginal utility of work; more income is required to offset consecutive equal increases in the amount of work. Further, increasing marginal disutility of work implies that as one moves along a horizontal line, the slopes of the indifference curves increase; or, given a level of income, total utility from both income and leisure decreases as the amount of work increases. Likewise, decreasing marginal utility of income implies that as one moves along a vertical line, the slopes of the indifference curves increase. The curves are concave upward, becoming vertical at the physical limit to the amount of time worked; they curve upward and approach the vertical asymptotically.

4. Finally, the assumption of perfect knowledge in the spheres listed is crucial in the failure of the market mechanism to operate as it should in pure competition. It is the informational inequality between doctor and patient which allows the physician some control over the demand in addition to that derived from the patient's view of the uniqueness of his services.

It has been shown that because of the economic characteristics of physicians' services, the conditions necessary for pure competition are not fulfilled in the market for those services. The conditions are much more closely approximated in the field of general practice than in the various specialties, and these two areas will be distinguished throughout this analysis. If pure competition could and did exist, the various
systems of payment would tend to produce the same results; because it cannot, it is valuable to determine the effects of alternative systems of payment upon the allocation of resources. The three basic alternatives which will be in this study are

1. fee-for-service, in which the physician is paid according to the number and type of services he performs,
2. capitation, in which the physician is paid according to the number of patients for whom he is responsible, and
3. salary, in which the physician is paid according to the amount of time for which he is engaged.
III. FEE-FOR-SERVICE

Under a fee-for-service system of payment, the physician is paid according to the number and type of services he performs. In seeking to attain his highest possible level of satisfaction, he may directly vary the amount of leisure time he has by affecting the number of services he performs. He may also try to influence his attainable combinations of leisure and income by increasing the demand for his services either by appealing to patients in socioeconomic groups with a high ability to pay or by directly affecting the number of services demanded by his patients. In addition, he may vary the quality of the services he provides and the fee he charges for each service within the limits dictated by the degree of competition among physicians in his market area and by the capacity of his patients for evaluating his work and charges and those of alternative sources of care. In analyzing the physicians' incentives under a fee-for-service system of remuneration, it is helpful to introduce the following model.

The individual doctor is capable of performing many different services. In fact, each service will be unique since each patient at each different point in time is unique. The services may, however, be classified into various groups for simplicity. For each group the physician will face a given demand curve, which depends upon both the individual demand curves of those seeking care and the degree of competition among physicians. The former depends largely upon the manner in which the patient perceives his state of health and the benefits to be derived from seeing a doctor, and the resources accessible to the
patient for medical expenses. The latter reflects mainly the degree
to which other sources of care are available as substitutes for the
given doctor's services. For the purposes of this analysis, it is
best to treat the doctor as performing only two types of services:
those in which he is a specialist and those which are routine. Each
has its own demand curve. The analysis may be extended to as many
different classes of services as desired, with no major change in

 technique.

The demand curves may be depicted on a graph, with price in dollars
represented on the vertical axis and the number of services on the
horizontal axis. (See Graph 2.) It is useful, however, to transform
the demand curves in the following way. Given the number of each type
of service that the individual physician can perform in an hour, we
may draw the demand curves in terms of hours of service. (See Graph 3.)
Implicit in each of the new demand curves will be a given level of pro-
ductivity of the doctor. Having now corresponding units on both graphs,
we may aggregate the demand curves to obtain a total demand curve for
the doctor's time. (See Graph 4.) Given this demand curve, the amount
of the doctor's time (and therefore the number of services) actually
forthcoming will depend ultimately upon the shape of his indifference
curves between income and hours spent in work. From the demand curve,
a total revenue curve can be drawn and superimposed upon the indifference
map. (See Graph 5 and Graph 6.) At the point where the total revenue
curve is tangent to an indifference curve, the doctor will maximize his
total satisfaction; if he increases or decreases the number of hours he
Graph 2.

Demand curves for routine and specialist services

Price

Number of specialist services

Price

Number of routine services
GRAPH 3
Demand curves for the physician's time

Price

Hours spent in performing specialist services

Price

Hours spent in performing routine services
GRAPH 4

Combined demand curve for the physician's time

Price

Hours of physician's services
Marginal and total revenue in terms of time for the simple monopolist

Price and marginal revenue

Hours of physicians services

Total revenue (income)

Hours of physicians services
GRAPH 6

Determination of equilibrium

Income

I₁ I₂ I₃ I₄

Total Income

Hours of physicians services
works, he will move to a lower indifference curve, representing a lower level of total satisfaction.

Those special characteristics of medical care which we have discussed allow the physician to alter his behavior significantly from that of the entrepreneur in a perfectly competitive market. By changing his behavior, he can change his total revenue curve and thus affect his final equilibrium with respect to income and leisure. We shall proceed by making successive assumptions concerning physician behavior and compare the results.

Under the assumption that the physician behaves as a simple monopolist, there is a discontinuity in the marginal revenue curve. (See Graph 5.) The total revenue curve will decrease in slope rather sharply up to the quantity at which the combined demand curve bends; at this point the slope will begin to increase sharply. It will continue to decrease from there on out, but at a slower rate.

We have shown, however, that the physician can separate the market for his services as a specialist from the market for his services in routine matters. In this case, the marginal revenue curve makes a corner but remains continuous. (See Graph 7.) The total revenue curve may again be drawn, but for all quantities greater than that at which the new marginal revenue curve bends, the new total revenue curve will lie above the old. (See Graph 7.) If the doctor produces a quantity greater than that at which the marginal revenue curve bends, a new point of tangency will be forthcoming. He will charge a different price
GRAPH 7
Marginal and total revenue with market division

Price and marginal revenue

Total revenue for market divider
Total revenue for simple monopolist

Hours of physicians services

Hours of physicians services

Total revenue (income)
in each market, equating the marginal revenue in each market. The price in the market for non-routine services will be greater than that in the market for routine services, since the price elasticity of demand in the latter is lower.

The opportunity for even more thorough price discrimination is present, however, since almost all services are incapable of being transferred from one patient to another, thus making, in most cases, a separate market of each individual patient.

The conditions with respect to price discrimination differ widely, however, in the market for the routine services of the general practitioner and in the market for specialists' services. In the first place, the demand curve for routine services is far more elastic, and therefore only slight upward changes in price are possible. The specialist faces a far less elastic demand curve and can therefore change the price to a greater extent. The extra effort involved in keeping records and trying to estimate the level at which the price may be set is much less likely to be sufficiently rewarded by the resulting increase in income in the case of routine services than in the case of specialist services. In the second place, if the fact that a doctor practices price discrimination becomes known to his patients, and if alternative sources of care which do not practice price discrimination are available, the demand curve for the discriminating doctor will shift downward. Collusion to eliminate such alternative sources of care (whether intentionally for this purpose or justified on other grounds, as the practice of charging
according to the patient's ability to pay has been in the United States) will ensure the continued ability to practice price discrimination. But if such collusion is not effective, the comparability of most routine services and their greater frequency (which allows price information to become more widespread) mean that examples of price discrimination are likely to become known and lead to a downward shift in the demand for the given physician's services. For specialist services, however, the likelihood of discovery is far lower, and price discrimination may be possible to a significant extent.

The case of the market divider who is also a perfectly discriminating specialist is illustrated in Graph 8. His marginal revenue curve is identical to his demand curve up to the point at which that demand curve bends. At this point it also bends and continues below the demand curve. At every point the total revenue curve lies above the total revenue curve of the market divider who does not practice perfect discrimination as a specialist. Thus the physician can reach a higher indifference curve by practicing perfect discrimination as a specialist.

Another of the important aspects of medical care is the ability of the physician to influence the location of the demand curve for his services by altering the demand curves of individual patients. As has been noted, the latter is affected by the patient's perception of the state of his health and of the doctor's ability to improve that state. Since the physician acts in the role of advisor, he may alter the number
Marginal and total revenue with market division and perfect discrimination in the specialist market.
of services demanded at any given price, and his ability to do so is much greater for his services as a specialist than for routine services. This ability to shift the demand curve may be represented graphically by an increase in the quantity of his services demanded at each possible price. (See Graph 9.) The ability to shift the demand curve in this manner is limited by the patient's ability to pay for more services and by the physician's ability to manipulate both the patient's perception of his state of health and the patient's perception of the expense and effectiveness of the physician's ability to alter that state relative to the expense and effectiveness of other sources of care.

It should be noted that by increasing the demand for services of certain types, the doctor may cause the "ideal level of demand" to be more nearly approached by making the patient aware of needs he did not formerly perceive. However, subject to the conditions imposed by the relationship of quality of services to his demand curve, it will be most profitable to him to avoid those services whose price is less than the doctor's estimate of the income he would derive in the future if the services were not performed. In such cases the actual demand will be less than the ideal. However, he will encourage all other services which do not have this result. For almost any service the probability of a successful outcome is less than one because of the incomplete knowledge of medical science, the limitations of the physician's knowledge, and the incomplete knowledge concerning the patient's condition. Thus the doctor can raise the level of demand by overstating the probability of
Induced changes in demand and total revenue curves

Price

Hours of physicians' services

autonomous + induced

Income (Total revenue)

Hours of physicians' services
of success, by overstating the benefits of the service, or by even falsifying the information he provides to the patient as a basis for decision-making. There is little check available on any but gross infractions of this nature. A further method of increasing his demand at the expense of his colleagues is found in the failure to recommend patients when such recommendation is indicated but not absolutely necessary.

This ability to shift the demand curve, when translated to a total revenue curve in terms of hours and superimposed upon the indifference map, also results in a total revenue curve which is uniformly higher than in the absence of this ability. (See Graph 9.) The effect this will have upon the price and quantity of services performed will depend upon the shape of the indifference curves. (See Graph 10.)

It is reasonable to assume that physicians have in mind a given level of income which they wish to receive, partially determined by past commitments of income and partially by general attitudes about the needs for which he will use the income which are largely culturally determined. Under such conditions, the indifference curves will be relatively flat up to the point at which the desired income is reached; at this point they will become almost vertical. As we move up the map, however, the curves will become increasingly steep as the level of satisfaction rises. As long as the indifference curves remain relatively flat, there will be a relatively great increase in the number of hours worked as well as in income. (See Graph 10A.) The price will increase only slightly. This may be seen in the graph of the demand curve also.
Two indifference maps and induced demand
In this case the quantity of services autonomously requested in actuality is decreased, but there is an actual increase in the total number of services performed and in the price of those services. (See Graph 9.) The decrease in services autonomously demanded is effected for the most part by the loss of patients to other doctors. Only a few will continue with this doctor but demand fewer services because of their higher price. This will mean an increase in the demand facing other doctors and will cause them to increase their prices also. Thus this results in an increased price throughout the system, and in turn shifts the original physician's demand up slightly, since competition now permits higher prices.

If the indifference curves are relatively steep, the price will rise to a greater extent, while the number of services performed increases only slightly. (See Graph 10B.) In fact, if the indifference curves are sufficiently steep, the number of services actually performed may even decrease. The same process as described above will spread the price rise throughout the system. These steeper indifference curves will be found when the doctor's income is high in relation to his tastes and his needs for income. However, as income increases, tastes change; and the level of income desired is likely to rise. Thus the first case discussed is the more significant for explaining actual market behavior.

In relating the demand curve to the physician's indifference map, the number of services per hour, or the level of productivity of the physician, was used to translate the demand curve in terms of services
into one in terms of hours and to locate the corresponding total revenue curve. One of the major ways in which the doctor can raise his level of satisfaction is by increasing the number of services he performs per hour, that is to say, by decreasing the amount of time spent in performing each service. We shall assume that the disutility of a given hour's work and the quality of the given service remain constant.

The effect of an increase in productivity may be illustrated graphically in the transformation of the demand curve for the physician's services to the demand curve for hours of his service. (See Graph 11.) As stated previously, the demand curve in terms of time implies a given level of productivity. With an increase in productivity, the demand curve will now intersect the price axis at a higher point and the axis measuring the number of hours further to the left. The new curve for total revenue in terms of hours will reach its maximum at the same income but at a lower number of hours. Since innovation is a matter which will affect the physician over a long period of time, the indifference curves will be relatively steep. The higher level of productivity will allow the physician to reach a higher level of satisfaction, and the increase in satisfaction will probably be taken in some combination of both greater income and greater leisure. (See Graph 11.) This implies an increase in the number of services performed, with a decrease in their price. As in the previous case, the decrease in price will be spread throughout the system. The increase in the level of satisfaction must be greater than or equal to the cost of raising the doctor's productivity, which includes that of acquiring new knowledge, new physical equipment,
Demand and total revenue curves with changes in productivity
and/or additional manpower.

In practice, essentially the same result can be achieved by changing the nature of the service so that it takes less time to perform, but so that the change is not perceived by the patient as detrimental to the quality. Changes of this sort tend to be made gradually and include such things as increased use of the telephone in place of office visits and a decrease in the number of house calls made. The cost of such changes tends to be very low, so that this type of change will be made almost every time the opportunity is present.

One significant variation on the fee-for-service method of payment is found in the reimbursement of the patient for a certain percentage of the fees he pays. As Arrow has demonstrated, uncertainty, especially with respect to the incidence of disease, will result in a demand for insurance to eliminate this source of risk. The incentive will be much stronger in non-routine cases where the uncertainty involved is greater by definition. The same provision for reimbursement may also be made for routine services, however, either through insurance or through other schemes financed by a third party. The effect of this is to raise the individual's demand curve for services, for it means that the cost to him is only a fraction of the actual cost. From the level of demand obtaining when the patients incur the entire cost of care (D_1), the level of demand when a given percentage of the cost is reimbursed by a third party may be derived, assuming that the patients have the

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finances necessary to cover the cost in the period between the time at which they incur the cost and the time at which they are reimbursed. (See Graph 12.) For example, if the patients are reimbursed for fifty percent of the cost, their demand will be at the level at which the cost to them is represented by \( D_1 \). The actual demand, \( D_2 \), will be twice as high as the original for any given quantity. In the limiting case, a vertical line, \( D_3 \), represents the quantity demanded when there is no financial limitation at all. The ability of the doctor to induce demand may be represented by a shifting of the induced demand curve similar to that introduced earlier in this chapter. With this increase in demand, the physician can reach a much higher level of satisfaction, and his incentive to induce demand becomes even stronger than before. There will be a relatively great increase in his price and the number of services rendered will increase by only a small amount or will actually decrease, since his leisure becomes relatively more valuable to him than it was before. In the one hundred percent reimbursement case, where the demand curve becomes vertical, he can charge as much as he likes, if there are no institutional barriers on the fees he sets.

These results demonstrate the necessity of some sort of outside control on the prices charged, since the financial resources of the patients no longer serve as a significant limiting factor. These controls may be placed either directly on the physicians by limiting the fees which may be charged, or indirectly, by limiting the amount which will be reimbursed for a given service. Due to the likelihood
GRAPH 12
Reimbursement and Autonomous Demand

\[ \text{Price} \]

\[ \text{Quantity of services} \]

\( D_1 \) - (Autonomous Demand)

\( D_2 \) - (Autonomous Demand with 50\% reimbursement)

\( D_3 \) - (Autonomous Demand with full reimbursement)
of evasion, it is far more likely that the latter course will be taken.

In this chapter we have developed a model for the market for physicians' services under a fee-for-service system of payment and shown the effects of this system which arise from the special characteristics of medical care with respect to a number of important aspects of physicians' services. We shall proceed to examine the effects of a capitation system in the next chapter.
IV. CAPITATION

The essence of a capitation system is that the physician is paid according to the number of patients for whose care he is responsible, no matter how many services he performs or how much time he expends in caring for his patients. Payment under a capitation system has only been used in conjunction with third party agreements. One characteristic of the system is that the remuneration per patient per time period is the same for all patients except those in certain broad classes. Thus the physician must work with a set capitation fee which determines the relationship between the number of patients on his list and his income. In attempting to maximize his welfare, he may vary the number of patients cared for and the demand of the patients he cares for. By varying the number of patients he accepts, he directly affects his total income. He may also attempt to vary the amount of disutility involved in caring for his patients by seeking those socioeconomic medical groups (especially the healthy poor) who demand fewer services per patient and by avoiding those socioeconomic medical groups (especially the wealthy sick) who demand a great number of services per patient. In addition, he may attempt to directly affect the level of demand of each patient for whom he cares. In these ways, he may affect the level of satisfaction he may attain. In addition, he may vary the quality of the services he renders within the limits dictated by the degree of competition for patients in his market area and by the capacity of the population for evaluating his work and that of alternative sources of care.
Another characteristic of payment under a capitation system in conjunction with a third party is that the amount demanded by each individual patient is only minimally related to the level of the fee in the next period since any increase in cost is spread among all participants. Once the individual's contribution to the cost of providing the services has been made, the financial nexus with the number of services requested in the present period is completely broken, and other factors become the significant determinants of the number demanded. If the payment for medical care is financed from sources other than payments of patients, even the link with future cost is weakened, as it will be spread over a larger number of persons.

Conversely, the physician's marginal revenue for performing any given service is zero with respect to the present period. However, since the patient may change doctors in future periods, the quality and quantity of services performed in the present period will be related to future income. The physician's aim becomes that of reducing the number of services performed for each patient to the minimum consistent with retaining his patronage in future periods. The ability to do the latter depends upon the alternative sources of care available to the patient.

As discussed in relationship to insurance and fee-for-service, when the financial incentive for remaining with one doctor is removed, some process must be found by which the duplication of services (resulting from uncertainty and the knowledge gap between patient and physician) is prevented. The most practicable means under a capitation system is
limiting the patient to one doctor for specific periods. Changing residence or location of both patient and physician in itself requires some ability to change physicians. Furthermore, competition with regard to the services provided can only be maintained if the possibility of switching is maintained. Thus some compromise must be found to maintain competition and to prevent duplication of services. The requirement of remaining with one physician for a minimum period of time, after which a change may be permitted, will involve, however, some of the undesirable effects involved in maintaining competition among doctors.

For the potential general practitioner the relevant economic variables with respect to entry into this field are the expected earnings, the expected output of time, the conditions under which he will work, and the stringency of the physical and emotional demands of the type of work. These are measured against the values of the same variables and the costs of preparation in other fields of endeavor. The absolute level of the amount of remuneration per patient per time period is significant in determining the expected income and therefore the number of new entries into and exits from general practice. Its level in relationship to other possible vocations will be especially important in the long run, while in the short run only large differences will result in significant changes. More important in the short run is the relationship of the level of compensation expected in general practice to that which may be attained by specialization. In addition, if the possibility of practicing under a different system of payment is present, the set fee must promise an
equivalently attractive income.

In a capitation system, the patient's interest is in the number and quality of services he receives. The doctor's interest is in the number of patients on his list, since his income varies directly with this figure.

Given the patient's perception of his need for medical care and the inconvenience of, fear of, and distaste or dislike for physician visits, a certain number of services will be autonomously requested by each patient. The function of the physician as adviser allows him some control over future visits of the patient.

Given the individual physician's reputation, office location, and other such factors, a certain number of patients will seek his services. Given his level of productivity, the physician can roughly estimate for each patient the amount of time needed to retain the patient in future periods. In making his estimate, he will take into account

the number and type of services the patient will demand autonomously, plus

the number and type of additional services which will be economically wise, plus

the cost in time and effort of persuading the patient to use these additional services, minus

the number and type of services which are not economically wise, plus

the cost in time and effort of dissuading the patient from using these services.
These estimates may err due to the uncertainties of individual demand as well as imperfections in the method of estimation. Nevertheless, some sort of rough estimates may be arrived at in the doctor's mind. Given these, we may graph the results, ordering the patients from the least number of hours demanded to the greatest, each patient representing an equal increment in the physician's income. (See Graph 13.) The result will be a polygonal line with the slope of each segment less than or equal to that of the previous segment. Each segment will have a positive slope. When this total revenue curve is superimposed upon the physician's indifference map, the equilibrium quantity and income may be found.

Now, there will be some patients for whom the estimated time is so great that no doctor will find it beneficial to have them on his list, or, the maximum amount of time the doctor will be willing to devote to them will be that amount they are spending on the marginal patient, and this may be still far less than the patient needs or desires. In such cases some change will have to be made if these patients are to receive medical care. There are two ways of dealing with this problem within a capitation scheme. One is to assign these patients to a doctor. The other is to raise the designated sum of payment for those belonging to certain classes of patients which require an especially great amount of care. In the first case the fact that it is not profitable for the doctor to provide the patient with all the services he needs makes it
GRAPH 13
Total revenue and equilibrium
necessary to enforce a minimum standard of care if quality is to be preserved.

Significant in determining the equilibrium point is the doctor's estimate of the number of hours he will have to spend on each patient in order to satisfy that patient's perception of his need for medical care. By minimizing the latter, he can increase the number of patients on his list and therefore his income. One method of minimizing this amount of time is to undertake all those services which promise to lessen future demands for his care. This will include what is usually designated as preventative care. This will involve him in the process of educating the patient in self-treatment, in discouraging services which are not necessary, and in encouraging the patient and overcoming fears of additional services which may be necessary. The amount and kind of services autonomously demanded by each patient will probably differ from the ideal because of his lack of knowledge and his quest for security with respect to his health. In some cases he will request services which are unnecessary or even harmful, while in others he will not recognize his own needs. The physician has every incentive to correct such situations, to try to approach the ideal allocation of resources with respect to his services whenever possible. In cases where he encounters stupidity or stubbornness, it will be profitable for him to perform unnecessary services only up to the point at which the total amount of time devoted to the patient represents the same amount of time required by the marginal patient.
Under a capitation system a problem arises from the fact that the individual physician has no financial constraint on the number of recommendations he makes or the number of advisory opinions he requests from outside specialists. Other constraints may exist (indeed, must be devised), but within the boundaries of these, the possibility of lessening the work load and thereby increasing the number of patients on the doctor's list, the ability to shift the blame for adverse results, the uncertainties of medical care which make advisory opinions desirable as a means of increasing the degree of certainty, the pressure from patients who have a high regard for specialists, and the increasing number of specialties as medical knowledge increases and makes each physician relatively less competent in many fields -- all encourage the overutilization of specialist and consultant services, as the latter take on tasks which could be performed by the original doctor and are consulted when the probability of gain is very low.

Essentially the same situation exists with respect to the prescription of drugs and the provision of certifications of illness. Unless there is a financial restraint provided, the cost of such actions is so low that overuse will result.

In this chapter we have examined the effects of a capitation system of payment. In the next chapter, we shall examine the salaried system of payment, comparing it with both the capitation and the fee-for-service systems.
V. SALARY

A salary may be defined as "an amount of money which by contract is payable to an employee for his services during a week, a month or a year."¹ Some of the terms in this definition deserve fuller discussion. First of all, note that for the duration of the contract, a salary remains at a given amount. Thus, within a significant length of time, the physician's remuneration is fixed; as in the case of capitation payments, the marginal revenue for performing any given service within that time period is zero. With a fixed income and a predetermined group of patients, the only way in which the doctor can raise his level of satisfaction is by gaining additional leisure, and this can be done by varying either the quantity of services he provides and/or the quality of those services. In some institutional frameworks, the amount of time spent by the physician may not be within his control. In this case, his only means of raising his level of satisfaction is by lessening the disutility of the time spent. Unless otherwise indicated it will be assumed that he can vary the amount of leisure time he has to some degree. He may also attempt to manipulate patient demand so as to give him the greatest freedom possible in increasing his leisure. The quantity and quality of services performed become of importance to the physician only to the extent that they affect future income and present leisure.

¹ Riegel, John Wallace, Salary Determination, (Ann Arbor, University of Michigan, 1940), p. 3.
Riegel states that "salaries are commonly paid for essential work performed by persons with unique skills-and knowledge where replacement is costly."\(^2\) Though the doctor's skills are not unique, neither are they common. Moreover, the doctor does have a unique knowledge of the patients for whom he cares, and replacement of the doctor is costly because of the time and effort expended in selecting a successor from the new applicants (whose relative efficiency and ability are difficult to ascertain) and because of the time required for the actual successor to build a similar store of knowledge of the individual patients. This fact limits the competition in the market for the services of salaried physicians. Further, states Riegel, the pay of salaried employees "properly is fixed with reference to their services during a typical month or year, rather than a typical day or hour."\(^3\) Thus, the third party estimates the amount of time which will, on the average, be required, and it is in accord with this amount of time that the salary is set. This amount will of course be roughly proportional to the number of patients cared for, and the number and type of services which they can be expected to need. This fact, and the fact that the marginal revenue for performing any given service within a certain time period is zero, make the salaried system and the capitation systems quite similar, and the results of the two are in many cases similar.

Very important in the definition of a salary is the word "employee." In the models for capitation and fee-for-service systems, we have dealt

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\(^2\) Riegel, p. 4.

\(^3\) Riegel, p. 5.
in effect with a special case (that of the physician) of the economics of self-employment. To a great extent, the physician practicing under either of these two systems can vary the number of hours he works, the number of patients he cares for, and the number of services he performs so as to determine his income level. The framework within which a salaried doctor operates is quite different, however, especially in that the total remuneration is fixed by contract. The relationship obtaining between the patient and the employer or third party become important in determining the results of a salaried system of payment. Except in the case in which an individual pays a doctor a given salary for his own treatment and that of no one else -- a case which is virtually non-existent today -- the patients' satisfaction and/or the benefits to their health derived from the care received are not directly registered by an increase or decrease in the doctor's income as they are in a capitation or fee-for-service system. It is only through the third party, the employer, that such considerations have an effect upon the physician's remuneration. In the previous two cases, it was the individual patients who engaged the doctor, and it was their own individual levels of satisfaction (given the alternative sources of care) which determined the level of demand for a given doctor's services, whether in terms of actual services or in terms of the number of patients cared for. Here, however, it is the third party who actually determines the demand for the physician's time. In the determination of the
employer's demand for services, several factors are of importance. If the employer's income depends upon the satisfaction of the patients as it does in the case of many consumer programs, then the needs and desires of the patients will play a very important role in determining demand. Another factor may be the significance of the increase in productivity of labor to be gained by providing medical care for the employees of a firm. In either of these cases a third party may reap the benefits provided by the presence of external economies in the field of health care. Since these are especially important in the case of the prevention and confinement of contagious diseases, the demand for these types of services will be increased, since the employer may derive the benefits of services that are not profitable on the level of individual consumers.

Since the employer intervenes between doctor and patient with respect to the physician's income, the closeness of the relationship between this third party and the physician also become important in those aspects of the quality of care which are responsive to financial incentives. Thus, for instance, the level of the salary of the doctor depends partially upon the third party's perception of the physician's skill and diligence in performing his work. This perception will depend partially upon the patients' perception of these factors and the accuracy and strength with which these perceptions are impressed upon the third party. It will also depend upon the employer's own observation of the physician at work and the results of his work. The situation was
analogous in the case of patient needs, the demand for the physician's services depending upon both the patients' perceptions of their needs and the physician's perception of those needs as both are reflected by the employer in his perception and attitude toward those needs.

Thus the employer acts as a type of clearing house for the other two parties, and final demand for the doctor's services depends partially upon the perceptions received through the patients, perceptions received via the physician, and perceptions received through independent observation. It is obvious that increased accuracy of any of these perceptions, ceteris paribus, will cause actual demand to more nearly approach the "ideal level of demand," yet increasing the accuracy of any of them is not costless.

Thus, one significant element in a salaried system is that the finer marginal adjustments of the fee-for-service and capitation systems are no longer possible, because the function of making these adjustments devolves upon the third party rather than the individual patient. While contracts can be renegotiated at certain points in time, the effects of renegotiations are much less immediate than those produced when individual patients can change after any given service or at any given time. In this situation, the physician has more leeway in any given case, for poor performance may to a certain extent be balanced by good, without having an immediate effect.

When the opportunity to practice under different systems of payment exists, the rewards of working under the salaried system must be equivalent to those expected under other systems when the market reaches
equilibrium. Because certain differences may cause one system to be inherently more attractive (as, for instance, the factor of risk with respect to the level of the doctor's income is greatly reduced under a salaried system), actual monetary rewards may differ, but they must differ by that amount which equalizes the overall attractiveness of the different systems.

Moreover, when the opportunity to practice under different third parties exists and the employers must compete for physician's services, the level of remuneration of different positions must in equilibrium also be such as to equalize the overall attractiveness of those positions. Foremost among the criteria of attractiveness is the amount of time required of the doctor, but the type of work and amount of training required are also important. In addition, such factors as location, the opportunity to practice among distinguished and inspiring colleagues, and the social prestige of the position are commonly of significance. Deviations may exist, especially during the period in which a contract is still valid. Because both employer and physician must estimate the time which will be required of the doctor (the other variables are more easily weighted), and these estimates are subject to error both because the criteria upon which they are based may provide only a rough approximation and because the process of estimation is subject to human miscalculations; therefore, deviations may occur. The estimate will depend greatly upon the number of patients, the past needs of the patients, and the past level of productivity (or services per hour) of the
physician, and the information about these variables provided by patients and the physicians formerly employed in the position. The extent of deviation from the actual amount of work required is limited, not in the present, but in future contracts, when the doctor can choose among many employers in making future contracts.

As in the capitation system, once the salary is paid, the marginal cost to the patient of any given service is zero. The same relationship between cost in future periods and present demand for services also obtains. Also similar is the necessity for limiting the patient to a given doctor for a certain minimum period, once the financial nexus is broken. This is necessary both to avoid the duplication of services and to limit the cost incurred in the doctor's gaining of knowledge about new patients' histories. To some extent, the same effect may be produced by attaching a cost to alternative sources of care or to the act of changing doctors, whether the cost be in actual money or in additional obstacles to overcome.

Given the fact that once the level of remuneration has been decided the marginal revenue for performing any given service is zero with respect to the time period stated in the contract and the patients' demands for services are virtually independent of the cost of these services, the doctor's ability to influence the number and type of services demanded may be used by him in two very different ways. He may attempt to raise the employer's demand (which depends largely upon the estimated number and complexity of the services which will be
required of the physician) by increasing the number and complexity of those services demanded. On the other hand, he may attempt to lower the number of services and therefore the time he must expend to the minimum necessary to retain his position. Since the employer is somewhat removed from the actualities of the situation and especially if there is little patient dissatisfaction to bring the situation to the employer's notice, the latter may be possible without causing a decrease in his salary. In either case, the knowledge gap will hinder accurate judgment on the part of the employer. In the former case, however, the physician must make the situation known to the employer in order to achieve his goal, and the increased demand for services may be used by the employer to demonstrate the need for greater care or skill on the part of the physician in performing his duties.

If the doctor were to take the former tack, analogously to the case of fee-for-service, his aim would be to provide all services which would not result in a decreased level of demand at a future period — in effect, to practice the very opposite of preventative medicine. This aim would be limited, however, by the extent to which the patients' health and satisfaction enters into the third party's estimate of the doctor's productivity. On the other hand, the doctor would be induced to make the patients aware of certain disorders which they might not otherwise perceive. There are three basic factors working against such a program on the part of the doctor. Unless the increase in demand continues over a long period of time, the employer is likely to consider it
a passing phenomenon and decline to make an adjustment in salary. In addition, it is possible that the employer will be close enough to the situation and will have the motivation to limit the extent to which the patients' health and satisfaction may be allowed to suffer without corrections being made for the quality of care. Furthermore, the doctor will be interested in the longer hours only at a greater than proportional increase in his salary, since the marginal disutility of work increases. But if the relative increase demanded is large enough to outweigh the costs of hiring an additional physician to share the load, the shifting of the demand for care will be of little avail to him. Thus it is likely that the doctor will not choose to use this ability in this way.

Instead, he will choose to try to minimize the amount of time he spends upon each patient, within those limits upon the quality and quantity of care he renders dictated by the relationships among employer, physician and patients previously discussed and the alternative sources of medical services. Preventative care will be encouraged in those instances in which it repays the effort expended. There is one respect, however, in which more services than are desirable for the optimum allocation of resources will be provided, even more than in the capitation system. In the capitation system, we found that the physician may find it advantageous to perform some unnecessary services in those cases in which the additional effort necessary still makes the time required by the patient less than or equal to that which would be
required by the marginal patient. In a salaried system this type of situation would not arise. In the capitation system he would also perform unnecessary services in those cases in which dissatisfaction of the patient might be detrimental to his public image to the extent that potential patients would seek other doctors. The salaried system would produce a similar consequence. The doctor would be induced to perform unnecessary services only for those patients which have the greatest ability to harm the image of him held by the third party. In this case, the amount and distribution of unnecessary care will depend upon the closeness of the employer to the patients.

The salaried case does provide a clear-cut contrast with a fee-for-service system with respect to the use of the ability to influence demand. In the latter, it was seen that the physician’s incentive was to raise the demand curve in any means possible, since additional unnecessary services would contribute to his most satisfying combination of leisure and income obtainable. In the salaried system, however, additional demand for unnecessary services reduces the doctor’s attainable level of satisfaction, and so the doctor is induced to limit these undesirable demands upon his time to those which cannot be overcome by educating the patient in those instances in which the patient may have a detrimental effect upon the employer’s perception of the physician. Thus, to a greater degree than in the capitation system, and in contrast to the fee-for-service system, the optimum allocation of resources is approached.
Almost every effect of the salaried system of payment depends crucially upon the relationships obtaining among the physician, the employer, and the patients. The amount of research done will depend upon the premium set on it by the third party. For those services which are clearly in the province of his contract, the physician will be encouraged to move the patient toward the optimum allocation of resources; but he will also, because of the same desire to minimize the amount of time per patient, be subject to the incentive to avail himself and the patient of the services of other physicians and of the use of time-saving devices on all justifiable occasions. Similarly, the incentive to please or to pacify patients will lead him to submit to patient pressures for such things as prescriptions and certificates of illness unless controls on these items are prescribed by the employer.

As pointed out at the beginning of this chapter, the salaried doctor is most obviously and most significantly distinguished from the doctor paid on a capitation or fee-for-service basis by the fact that he is an employee. In fact, it is his relationship with the employer which dictates most of the effects of a salaried service. The responsiveness of his services to the needs of the patients will depend upon the employer's perception of and attitude toward those needs (this being dependent in varying degrees upon the patients' own perceptions of and attitudes toward those needs) and his perception of the doctor's fulfilling of those needs with the services he provides. Thus a close working relationship between patient and employer and between employer and physician seems necessary. However, while the employer may be more
competent than the patient in judging the physician's performance, he cannot be as competent as the physician in evaluating the care provided for those patients. Thus it is unlikely that frictionless control over the doctor's performance can be exerted. If there exist a number of alternative employers, the problem may be easily solved; however, if there exists only one employer, a mechanism for settling disputes will be inevitable, and valuable time and energy may be wasted in the settling of such disputes.

In summary, almost all aspects of the quantity and quality of the care provided will be determined by the emphasis placed by the employer upon each particular aspect. The responsiveness of the quality and quantity of the care provided to the needs and desires of the patients will in turn depend upon the closeness of the relationship between the employer and those patients.
VI. FURTHER CONSIDERATIONS AND SUMMARY

In this chapter, we shall discuss certain additional considerations about the various systems of payment, after which we shall review the results previously obtained.

One aspect of the method of payment of the physician not yet discussed is its effect upon the long-run supply of physicians. The individual's long-run supply of labor depends upon "(a) his and his fellows' attitudes toward the type of work . . . and the conditions in which it must be performed . . .; (b) his estimate of the time and cost of preparing himself . . .; and (c) his expectations of the income per period . . ." The working conditions will include the independence allowed the physician, and in this respect the "self-employment" feature of the capitation and fee-for-service systems may provide an inherent attraction. The incentive to refer patients under the various systems will also affect their relative attractiveness as to the type of work performed. However, the attitudes of the prospective physicians and the society in which they live toward these features is determined by cultural forces, and their effect must be studied in conjunction with a given society at a given time. Another important consideration is that the prospective doctor's estimate of the time and cost of preparing himself may include the period in which he is building a practice. In such a case payment by a third party may alter the time distribution of the rewards for his labor and thereby affect this attitude toward the profession. Such features as initial practice allowances may make

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the distribution of returns more attractive, while such practices as buying the good will of a retiring physician may make that distribution less favorable.

With the exception of the following considerations concerning risk and the above considerations, it is the amount of income expected which will determine the long-run supply of physicians. This expected income is theoretically independent of the system of payment under which the physician receives this income. It is indeed unfortunate that this fact is not clear and that much of the criticism of the various systems of payment has been based upon considerations of the amount on income expected.

The expected income must be discounted for the risk the doctor undertakes with respect to income. The most outstanding risk is that of bad debts.

In the fee-for-service system, it is virtually impossible to receive payment before any care has been rendered, since the exact nature of the services to be performed is not known until the doctor has examined the patient. Thus the doctor's total income for a future period of time is relatively uncertain, depending as it does upon the number of patients who engage him and the number and type of services which will be performed, as well as the percentage of patients who will actually pay their bills. It is possible to set a standard fee for the performance of given services. Once this has been done, the amount of income to be received per service is certain, and it is possible to require payment in advance
or at least for the physician to estimate more exactly the probability that his bill will be paid. Once the amount of payment for future services is set, however, the physician encounters a somewhat different type of risk — a risk as to how much disutility he will suffer in order to earn the stated fee. In other words, the financial rewards which he receives for any given amount of his disutility will vary. He will have made a trade-off of risks between total income and the amount of time and energy he must expend. If a third party is involved, the risk of bad debts may be practically eliminated, so that his total income will depend upon the number of patients he cares for and the number and type of services they demand. If the services are categorized in the setting of standard fees, the physician will incur some risk as to the amount of disutility he will undergo in earning a given level of income.

A capitation fee, unlike a fee-for-service, can be paid in advance. By requiring this, the physician may eliminate bad debts. In this situation the risk the doctor incurs will be in terms of the amount of time and energy he must expend as a result of having agreed to care for the patient over a certain period of time. His total income will depend upon the number of patients he maintains upon his list. Because the number and type of services required by those patients are both uncertain, the amount of income he receives for a given amount of his disutility will be uncertain. Thus, in a sense, he will trade off a decrease in his ability to control the time and energy he expends for an increase in the certainty of the level of his income. Payment by a third party
would not significantly affect any of these considerations.

A salary implies payment by a third party. Under this system risk with respect to total income is minimized. While a contracted income may not be paid in advance, the willingness and ability of the third party to fulfill its contractual obligations with respect to income are relatively easily appraised. On the other hand, the number of patients, as well as the number and type of services required by each are uncertain, so that all three factors contribute to an uncertainty as to the amount of time and effort which will be expended as a result of the physician's entering into the contract.

One final topic which is more conveniently studied by directly comparing the three systems of payment is that of the administrative costs of the three systems of payment. These costs become especially evident when there is a system of government support of medical care, whether by completely taking upon itself the costs of care or by subsidizing either patient or doctor for the costs of medical care. Yet administrative costs are a cost of each system, whether or not they are so made evident by the role of the government.

To be sure, the salaried system offers the most predictable total cost of physicians' services. Since a contract is entered into by both parties for a relatively long period of time, the cost is known for the duration of the contract, and as the period draws to a close, many relevant figures can aid in the estimation of future expenditures. Furthermore, accounting costs are minimal, involving the payment of a
predetermined amount at regular intervals, with only a few changes, necessitated by changes in positions. It should be noted, however, that negotiation of contracts and the necessity for investigation by the third party and sometimes of arbitration of working conditions and sume of money do impose administrative costs.

A capitation system involves greater accounting costs than does a salaried system, but smaller accounting costs than does a fee-for-service system. In its simplest form, where a uniform payment is made for the care of each individual, the only effort involved is the keeping of lists of patients and the period of time they are in the care of a given physician, followed by the calculation and payment of a multiple of this number at intervals agreed upon by both parties. Costs remain fairly predictable over a period of several years, depending largely upon birth and mortality rates and the age composition of the group. Some investigation costs may arise to ensure that the doctor's reports of patients are correct, but a sufficiently severe penalty for misleading information could easily limit such abuses. If the capitation system is modified according to the type of patient cared for, administrative costs rise in accordance with the complexity of the classification system. In determining the amount of the capitation rate to be paid at the agreed-upon intervals, more bookkeeping will be involved for the physician because he must not only record the number of patients for whom he cares and the period during which they are under his care, but he must also determine the class of each patient and duly record it.
Cost of calculation of the sum also rises, due to the increased number of figures to be manipulated. The more complex the system of classification, the greater do these accounting costs become. Predictability of costs is lowered somewhat by the changing classes of the patients. Some of these changes are amenable to fairly accurate prediction for short periods of time at least, on the basis of trends with respect to birth rates, mortality rates, changes in marital status, age composition of the group, etc. Costs of investigation to avoid duplicity and to settle cases where such actions are suspected also rise in accordance with the complexity of the classification system.

It should be noted that total cost to a government of a capitation system can be made predictable when the doctors are paid only on the government's capitation system. For example, the English general practitioner is paid from a central pool of funds, whose total is determined by Parliament. Thus the level of the capitation fee is made to vary and the total payment to all general practitioners will be equal to this sum. Such a system does involve higher costs of calculation of the capitation fee in order that total payments exactly equal the amount allocated.

Under a fee-for-service system, accounting and administrative costs are at their greatest. The physician's burden of keeping records is greatly increased because he must keep records of each service rendered to each of his patients, and the physician must determine the value of each individual service which he performs. So long as total income
retains its relative attractiveness in comparison with alternatives for physicians and total cost to the patient maintains its relative position with respect to other sources of care, predictability of cost can again be assured over a short period of time by setting aside a given amount and calculating the amount of compensation for each service so as to ensure that the total paid out will equal the amount allotted. In this case, the greater quantity of data would make the calculations for the distribution of the total even more complicated than under the capitation system. If, however, the fees are determined without such a criterion, the predictability of total cost will be greatly lowered. In addition to all the factors involved in estimating the total under a capitation system, the exact illnesses sustained by each member of the population will be involved. The records of each physician will be greatly complicated as will the calculation of the sum to be paid to each physician at the designated points in time. Accompanying the greater complexity will be the greater possibility of falsification, and accordingly the greater need for and cost of investigation and adjudication of individual cases.

In examining the results of a fee-for-service system of payment, a model was developed for the determination of the equilibrium income of the physician, given the demand curve for his services. Various behavioral assumptions were made in light of the special characteristics of physicians' services. It was shown that the doctor will separate
the market for his services as a specialist from the market for his services in routine matters; furthermore, he will practice price discrimination among individual patients in the former, but in the latter this is possible only if there is collusion among physicians. The role of the physician as adviser allows him to affect the level of demand for his services; this is also practicable to a greater extent for non-routine services. It becomes most profitable for him to avoid any service whose price is less than the doctor's estimate of the income he would derive in the future if the service were not performed and to perform all those services which do not have this result. In other words, it is to his advantage to perform in the least economical way as far as society as a whole is concerned, except to the extent that he competes for patients who do not perceive their needs and who may choose another physician when they do. As a result of this, the price will increase and this price increase will spread through the system as a whole. The quantity of services performed may increase or decrease, depending upon the shape of the indifference curves of the doctor. The physician will innovate if and only if the cost of innovation is less than or equal to the expected increase in his income minus the amount of income necessary to compensate for the expected increase in disutility of the work involved. The physician can use other means which may result in a decrease in the quality of the services in an attempt to increase the number of services performed. If a third party provides part or all of the remuneration, it becomes
necessary to limit in some way the doctor's ability to induce demand, for the effects of this ability are magnified under such a system.

A second model was developed for the determination of the physician's equilibrium income under a capitation system of payment. In a capitation system, the quantity of the services demanded is only minimally related to the price, and the doctor's marginal revenue for performing any given service is zero with respect to the present income period and patient list. Some limits must be set on the patients' ability to change doctors, and these limitations will have both desirable and undesirable effects. Because the physician will desire those patients who demand a minimal amount of care, pressure arises for a classification of patients and graduated levels of capitation payments. If this sort of system is implemented, the capitation system tends to become more closely related to a fee-for-service system, since number and type of services becomes a partial basis for the remuneration of the physician. In addition, some patients must be assigned to physicians, and enforcement of minimum standards of care may be necessary if competition among doctors is weak. It is necessary that the level of remuneration be in balance in the various fields of medical practice. Moreover, the physician's incentive to minimize the amount of time required to retain the patient upon his list, implies that some limits must exist on his ability to refer patients. Likewise, use of other related health facilities will be encouraged within the framework of the capitation system itself, unless specific limits are placed upon
the use of such facilities.

Finally, the salaried system was analyzed in relationship to the capitation and fee-for-service systems. Among the three systems, the salaried system alone necessarily involves an employer-employee relationship and development of bargaining strength, whether individually or in association with other physicians, becomes the dominant financial goal of the doctor. The doctor's ability to induce demand will be used as it was in the capitation system, thereby leading to a more efficient allocation of resources. The ability to utilize related services, to perform research, to innovate, and, indeed, to perform with respect to almost all other aspects of physicians services will depend upon the emphasis placed upon these items by the employer. The fulfillment of patient needs and desires will depend upon the relationship among the perspectives of both patient needs and the physician's performance seen by the physician, the third party, and the patient. Because of differences in these perspectives, a salaried system implies the need for machinery to resolve differences among the three perspectives.

In conclusion, it must be added that some combination of the systems of payment may result in the most effective method of remunerating physicians. Variations of the degree of reliance upon given systems will allow an infinite number of possibilities for such combinations. In any of these combinations, however, the basic forces revealed in this paper will be at play. Clearly, the system of payment has material effects upon the quantity and quality of services rendered. A recognition of these effects is essential to the wise utilization of our medical resources.