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# 1

# Differences Over Time, 1948-68: A Statistical Decomposition

In Part 1 we examine the rate of change in expenditures and related variables over the period 1948-68 and for subperiods 1948-56, 1956-66, and 1966-68.[1] The growth rate for any period is calculated by treating the variable under study as a logarithmic function of time and fitting a least-squares regression through all the annual observations. The regression coefficient of time is equivalent to average percentage rate of change continuously compounded.

The rate of change in different subperiods varied greatly for expenditures per capita, quantity per capita, and quantity per physician. Most of Part 1 is devoted to explaining these differences. This involves an examination of changes in price, insurance coverage, income, demographic structure, number and type of physicians, and medical technology.

## 1.1 Expenditures

### *Problems of Definition*

It is difficult to specify what should be included among expenditures for "physicians' services." The principal reason is the central role that physicians play in the entire field of health services. When a patient places himself in the care of a physician, he frequently is purchasing a wide range of diagnostic and therapeutic services, some of which will be rendered personally by the physician but many of which will involve the use of capital equipment or auxiliary personnel functioning under the control of the physician. For example, a physician may order several tests and x-rays as part of a physical examination. Are the costs of these tests and x-rays to be considered part of the cost of the physician's service? Most students of medical care would say they should be because the tests and x-rays are an integral part of the examination. However, the official statistics of the Department of Health, Education, and Welfare treat such costs in this fashion only if payment is part of the gross receipts of the physician. The very same tests and x-rays that are included if the patient visits the doctor's office may not be included if the doctor treats the patient in the hospital. Furthermore, though the operating room is an integral part of the service rendered by a surgeon, expenditures for its use (and for associated nursing personnel) are not considered part of the cost of the surgeon's services.

Not only is the classification of auxiliary services ambiguous, but the measurement of direct personal service rendered by physicians is also clouded by institutional arrangements. The Department of Health, Education, and Welfare expenditures statistics essentially cover only physicians in private practice; the cost of services rendered by physicians who are salaried members of hospital staffs is not included. During the period under study the percentage of active physicians who were salaried members of hospital staffs rose from 12 to 21.

In this study we are concerned with expenditures for services rendered by physicians in private practice. Series dealing with price, visits, number of physicians, et cetera are chosen to conform as closely as possible to this universe of expenditures. Physicians' services thus defined have accounted for between one-fifth and one-fourth of all health expenditures since 1948, with no trend discernible in the size of the share. They accounted for one per cent of the gross national product in 1948 and 1.4 per cent in 1969. Thus, there has been a 40 per cent increase in the share of the nation's resources devoted to this service in only two decades.

The exclusion of salaried hospital physicians results in an underestimate of the rate of growth of expenditures for all physicians' services. We have made several alternative estimates of the growth in expenditures for salaried hospital physicians; they suggest that the underestimate is on the order of 0.2 to 0.4 per cent per annum for 1948-68. Inasmuch as the growth in relative importance of hospital-based physicians was fairly uniform over the two decades, however, their omission is inconsequential for the analysis of differences between subperiods.

### *Problems of Measurement*

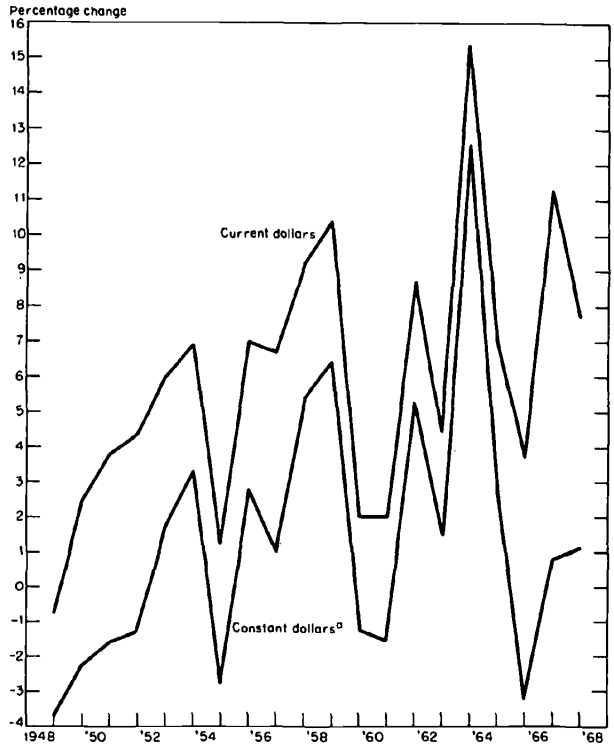
The Department of Health, Education, and Welfare series on expenditures for physicians' services exhibits

[1] The initial and terminal years for the subperiods—1948, 1956, 1966, and 1968—were all years of high levels of economic activity (as indicated by the unemployment rates in those years, which were 3.8, 4.1, 3.8, and 3.6 per cent, respectively).

striking year-to-year fluctuations, as shown in Chart 1. These erratic changes reflect similar movements in the gross receipts figures reported for physicians in private practice by the Internal Revenue Service, which form the basis for the HEW estimates.

**Chart 1**

**Percentage Changes in Expenditures per Capita for Physicians' Services, 1948-68**




Source: See Appendix A.

[a]Deflated by average price received (i.e., customary price adjusted for estimated effects of changes in insurance coverage; see p. 7).

Part of the erratic movement in the expenditures data appears to be related to inexplicable variations in the number of physicians filing income tax returns. For instance, between 1963 and 1964 the number of physicians filing increased by 8.0 per cent. The following year the number decreased by 2.1 per cent. The American Medical Association's series on M.D.s in private practice, believed to be reasonably accurate, does not show any annual swings of this nature. Over periods as long as five to ten years, the IRS and AMA series on number of physicians show almost exactly the same rates of change.

It seems likely that there are substantial errors in some of the year-to-year movements [28], and this raises grave doubts about the value of econometric analyses based on annual changes. Because the average rate of change over several years is probably much less subject to error, we shall give major attention to such changes in this study.

## *The Data*

Table 1 presents annual data on expenditures for private physicians in both total and per capita form. Table 2 shows the average annual rates of change, which are our primary interest. We see that there was a sharp acceleration in the rate of growth between the major subperiods 1948-56 and 1956-66, and a further acceleration in 1966-68. This conclusion is not sensitive to the choice of initial and terminal years; the same pattern of acceleration is evident if we use 1955 or 1957 instead of 1956, or if we use 1965 or 1967 instead of 1966. The figures in parentheses under the growth rates are their standard errors.[2] By applying a variant of the *t* test, we find that the differences between the subperiods are statistically significant even though there are relatively

**TABLE 1**

**Expenditures for Physicians' Services, 1948-68**

| Year | Total (Millions of $) | Per Capita ($) |
|---|---|---|
| 1948 | 2,611 | 17.99 |
| 1949 | 2,633 | 17.84 |
| 1950 | 2,747 | 18.29 |
| 1951 | 2,868 | 18.99 |
| 1952 | 3,042 | 19.83 |
| 1953 | 3,278 | 21.02 |
| 1954 | 3,574 | 22.47 |
| 1955 | 3,689 | 22.73 |
| 1956 | 4,067 | 24.31 |
| 1957 | 4,419 | 25.94 |
| 1958 | 4,909 | 28.32 |
| 1959 | 5,481 | 31.27 |
| 1960 | 5,684 | 31.90 |
| 1961 | 5,895 | 32.53 |
| 1962 | 6,498 | 35.35 |
| 1963 | 6,891 | 36.92 |
| 1964 | 8,065 | 42.59 |
| 1965 | 8,745 | 45.57 |
| 1966 | 9,156 | 47.25 |
| 1967 | 10,287 | 52.57 |
| 1968 | 11,188 | 56.63 |

Source: See Appendix A.

[2]The growth rate is the regression coefficient $b$ in the equation

$$\ln Y = a + bT$$

where $T$ equals time.

TABLE 2

Rates of Change of Expenditures for Physicians' Services, 1948-68

(per cent per annum continuously compounded)

| | 1948-56 | 1956-66 | 1966-68 | 1948-68 |
|---|---|---|---|---|
| Total | 5.7 (0.4) | 8.1 (0.3) | 10.0 (0.9) | 7.6 (0.2) |
| Per capita | 4.1 (0.3) | 6.6 (0.3) | 9.1 (0.9) | 6.0 (0.2) |

Note: Standard errors of rates of change are shown in parentheses.

Source: Table 1.

few observations.[3] Comparing the 1948-56 growth in per capita expenditures with that of 1956-66, the probability of obtaining a difference as large as the one observed as a result of chance is less than 0.01. For the comparison of 1956-66 with 1966-68, $p = 0.05$.

In the analysis that follows we shall concentrate on explaining these significant disparities in rates of growth, especially those between 1948-56 and 1956-66.[4] Heavy reliance on 1966-68 does not seem warranted, given the brevity of the period, the paucity of data, and the likelihood that some of the available data will be revised. Nevertheless, section 1.11 offers a brief discussion of this period. Here our first task is to separate expenditures into its price and quantity components.

## 1.2 Price and Insurance

The discussions of price and insurance fall logically together; there are several concepts of price that are relevant to our analysis, and the differences in their trends are closely tied to trends in insurance for physicians' services.

[3]The standard error of the difference between two coefficients is equal to the difference divided by the square root of the sum of the squared standard errors of each coefficient. Thus

$$t = \frac{b_1 - b_2}{\sqrt{S_{b_1} + S_{b_2}}}.$$

[4]Medicare and Medicaid were introduced in 1966; thus it is a logical break point in the time series.



### *Customary Price*

The Bureau of Labor Statistics collects information every month from physicians concerning their "usual and customary fee," and this information forms the basis for the physicians' fee component that goes into the medical care portion of the Consumer Price Index. The customary fee index is a weighted average of standard fees charged for an office visit by "family physicians" (formerly "general practitioners"), for an appendectomy, and for other specified categories of visits. This index may behave very differently from an index that measures the average price actually received by physicians, or from one that measures the net price paid by patients.

### *Average Price Received*

The average price received may deviate from the customary or nominal price for two principal reasons. First, physicians do not charge all their patients the customary fee [26]; they may charge poor patients significantly lower fees and may treat some without any charge. Secondly, physicians do not collect 100 per cent of the fees they do charge.

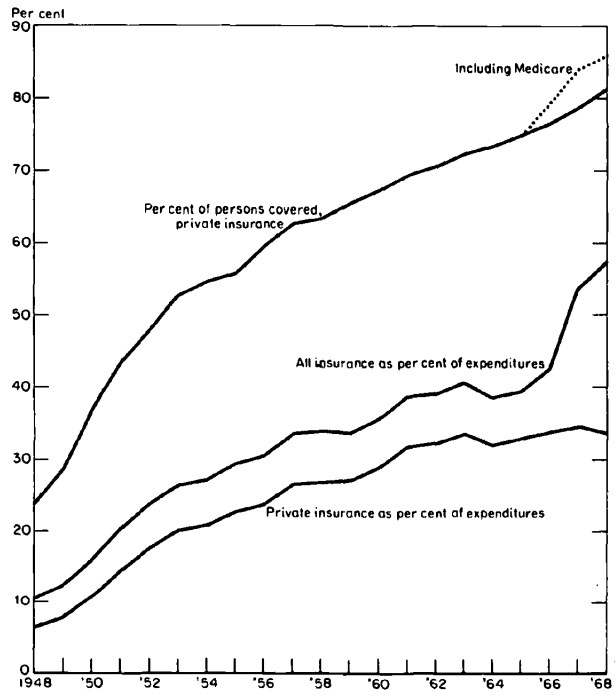
One of the uses of the price index is to obtain a series of the real quantity of services by deflating the expenditures series. For such purposes the appropriate price series is one that measures the average price received by physicians, not the customary price. To the extent that physicians charge less than their customary fee and to the extent that they fail to collect all the fees they do charge, deflation of expenditures by the customary fee would result in a biased estimate of quantity.

Our approach to both these problems is based upon the assumption that a physician is more likely to charge his customary fee and more likely to collect his charges when the service is covered by insurance.[5] The extent of insurance coverage has two dimensions: the number of people carrying protection, and the average level of protection per person insured. In both aspects of

[5]This approach was proposed and applied by Martin S. Feldstein [16]. We have utilized additional data and relaxed some of his assumptions in deriving our average price series. An alternative approach employed by Klarman et al. [28] utilizes direct estimates of changes in collection ratios, but makes no adjustment for deviations between customary and actual charges.

coverage dramatic increases were recorded during the postwar period. The number of persons with private insurance coverage for physician expenses grew from approximately 34 million in 1948 to 160 million in 1968, and average annual benefits per insured rose from $4.61 to $23.57. The contrast between the initial and terminal years becomes even greater when the Medicare and Medicaid populations are included among the insured and expenditures made under these programs are added to those covered by private insurance. All third-party payments together accounted for 11 per cent of expenditures in 1948 and 57 per cent twenty years later (Chart 2).

**Chart 2**
**Growth of Third-Party Payment for Physicians' Services, 1948-68**




Source: See Appendix A.

The ratio of average price to customary price in any year depends upon the proportions of insured and uninsured in the population ($I$ and $N$), the utilization per insured relative to utilization per uninsured ($U$), the fraction of customary price paid by insured persons ($K$), and the fraction of customary price paid by uninsured persons ($k$). More exactly,

$$\frac{AP}{CP} = \frac{U \cdot I \cdot K + N \cdot k}{U \cdot I + N}.$$

If everyone were fully insured ($N=0, K=1$), average price would equal customary price. Average price approaches customary price with increases in the percentage insured of the population, in the utilization ratio, and in the average payment ratio of insured persons. It is assumed that $K$ varies with the fraction of insured persons' utilization covered by insurance. Starting from a lower limit of $k$, it reaches an upper limit of 1.0 when all services purchased by insured persons are fully covered. $k$ is assumed to remain constant over time at 0.67. (The basis for our estimates of $U$, $K$, and $k$ and the sources of data employed in the application of this formula are given in Appendix B.)

According to our formula, the ratio of average price to customary price rose from 0.72 in 1948 to 0.89 in 1968. The average annual rate of change of average price from 1948-68 was 4.2 per cent, compared with 3.2 per cent for customary price. The disparity in the growth rates of the two price series was larger before 1956 than after that date. This conforms with the results of Klarman et al., based on estimates of physician collection ratios [28], and of Martin Feldstein [16].

### *Net Price*

While the growth of insurance coverage tends to raise the average price received by physicians relative to the customary price charged, it has the opposite effect on the net price paid by patients. To the patient, an increase in the share of the bill covered by insurance appears as a decrease in the price he pays. Following Martin Feldstein, we calculate net price as equal to average price multiplied by the fraction of expenditures the patient must pay directly:

$$NP = AP \cdot \left( \frac{\text{expenditures} - \text{third-party payments}}{\text{expenditures}} \right).$$

The three price series for physicians' services are presented in Tables 3 and 4 along with the Consumer Price Index for all goods and services. Table 4 shows that net price rose at the rate of 1.3 per cent per annum from 1948 to 1968. Its fastest growth was during 1956-66, and after 1966 it actually declined as a result of the large increase in third-party payments by government.

When net price rises more slowly than the price of other goods and services, physicians' services are relatively cheaper, and we might expect an increase in the quantity demanded. When net price rises faster than the

TABLE 3

Price Indexes of Physicians' Services and All Goods and Services, 1948-68

(1956=100)

| Year | Physicians' Services | | | All Goods and Services |
|---|---|---|---|---|
| | Customary Price | Average Price Received | Net Price Paid | Consumer Price Index |
| 1948 . . | 79.3 | 71.0 | 91.1 | 88.5 |
| 1949 . . | 80.7 | 73.1 | 92.1 | 87.6 |
| 1950 . . | 82.5 | 76.6 | 92.4 | 88.5 |
| 1951 . . | 85.1 | 80.8 | 92.6 | 95.6 |
| 1952 . . | 88.8 | 85.6 | 93.6 | 97.7 |
| 1953 . . | 91.2 | 89.2 | 94.2 | 98.4 |
| 1954 . . | 93.8 | 92.3 | 96.5 | 98.8 |
| 1955 . . | 97.1 | 96.1 | 97.1 | 98.5 |
| 1956 . . | 100.0 | 100.0 | 100.0 | 100.0 |
| 1957 . . | 104.3 | 105.7 | 100.4 | 103.5 |
| 1958 . . | 107.9 | 109.4 | 103.7 | 106.3 |
| 1959 . . | 111.5 | 113.6 | 108.1 | 107.2 |
| 1960 . . | 114.3 | 117.4 | 108.9 | 108.9 |
| 1961 . . | 117.2 | 121.6 | 106.8 | 110.0 |
| 1962 . . | 120.7 | 125.5 | 109.9 | 111.3 |
| 1963 . . | 123.4 | 129.1 | 110.2 | 112.7 |
| 1964 . . | 126.5 | 132.2 | 117.0 | 114.1 |
| 1965 . . | 131.1 | 137.8 | 120.1 | 116.0 |
| 1966 . . | 138.6 | 147.6 | 122.2 | 119.4 |
| 1967 . . | 148.4 | 163.0 | 108.1 | 122.8 |
| 1968 . . | 156.7 | 173.7 | 106.6 | 128.0 |

Source: See Appendixes A and B.

Consumer Price Index, we might expect the reverse. The magnitude of the effect is determined by: (1) the differential change in price and (2) the elasticity of demand for physicians' services with respect to changes in price. Most observers believe this elasticity to be quite small. If so, differential price changes will not have much effect on demand. The main point to be noted, however, is that whatever the size of the effect, Table 4 shows that it would be in the direction of *lowering* demand in 1956-66 relative to 1948-56 or 1966-68.

### *Impact of Insurance on Growth of Expenditures*

One of the factors commonly believed to be responsible for the sharp growth of expenditures for physicians' services is insurance (both private and public). According to this view, the growth of insurance coverage should be



TABLE 4

Rates of Change of Prices of Physicians' Services and All Goods and Services, 1948-68

(per cent per annum continuously compounded)

| | 1948-56 | 1956-66 | 1966-68 | 1948-68 |
|---|---|---|---|---|
| Customary price . . . . | 3.0 (0.1) | 3.0 (0.1) | 6.1 (0.4) | 3.2 (0.1) |
| Average price received. | 4.4 (0.1) | 3.6 (0.1) | 8.1 (1.0) | 4.2 (0.1) |
| Net price paid . . . . . | 1.1 (0.1) | 1.9 (0.2) | -6.8 (3.0) | 1.3 (0.1) |
| Consumer Price Index. | 1.8 (0.3) | 1.5 (0.1) | 3.5 (0.4) | 1.7 (0.1) |

Note: Standard errors of rates of change are shown in parentheses.

Source: Table 3.

considered as an exogenous phenomenon rather than as a direct result of an increased demand for medical care. Given the additional coverage, patients found that the net price to them of medical care was lower, and they responded by demanding more care. This increase in demand resulted in higher expenditures.

With respect to the period 1966-68, we find that this hypothesis fits well with the observed data. The rapid growth in expenditures coincided with a major increase in third-party payments, and, indeed, there appears to have been an absolute as well as a relative decrease in direct spending by patients after 1966 (see Tables 5 and 6).

On the other hand, this hypothesis is of no help in explaining the difference in growth rates before and after 1956. In fact, the relative growth of insurance was far more important in the first than in the second subperiod. We see that the differential between 1956-66 and 1948-56 in growth of direct expenditures by patients was greater (4.3 per cent per annum) than the differential for all expenditures (2.5 per cent per annum). Thus, this approach yields the same conclusion as the comparison of net price with the Consumer Price Index, namely, that differential changes in insurance cannot explain the upsurge of utilization after 1956.

TABLE 5

Relative Importance of Insurance for Physicians' Services, 1948-68

| Year | Per Cent of Population with Private Insurance | Per Cent of Expenditures Paid by | | |
|---|---|---|---|---|
| | | Private Insurance | Public Programs | Patients Directly |
| 1948 | 23.6 | 6.1 | 4.4 | 89.5 |
| 1949 | 28.1 | 7.4 | 4.8 | 87.8 |
| 1950 | 36.4 | 10.7 | 5.2 | 84.1 |
| 1951 | 43.3 | 14.4 | 5.7 | 79.9 |
| 1952 | 47.7 | 17.7 | 6.0 | 76.3 |
| 1953 | 52.5 | 20.0 | 6.3 | 73.7 |
| 1954 | 54.6 | 20.6 | 6.4 | 73.0 |
| 1955 | 55.5 | 22.8 | 6.7 | 70.5 |
| 1956 | 59.5 | 23.5 | 6.7 | 69.8 |
| 1957 | 62.7 | 26.7 | 7.0 | 66.3 |
| 1958 | 63.1 | 26.8 | 7.1 | 66.1 |
| 1959 | 65.6 | 26.9 | 6.8 | 66.3 |
| 1960 | 67.1 | 28.9 | 6.4 | 64.7 |
| 1961 | 69.3 | 31.9 | 6.9 | 61.2 |
| 1962 | 70.5 | 32.1 | 6.9 | 61.0 |
| 1963 | 72.2 | 33.5 | 6.9 | 59.6 |
| 1964 | 73.1 | 32.0 | 6.3 | 61.7 |
| 1965 | 74.9 | 32.9 | 6.3 | 60.8 |
| 1966 | 76.5 | 33.7 | 8.6 | 57.7 |
| 1967 | 78.8 | 34.4 | 19.3 | 46.3 |
| 1968 | 80.8 | 33.6 | 23.6 | 42.8 |

Note: Per cent of population covered by Medicare and/or private insurance in 1966-68: 1966, 79.1; 1967, 84.0; 1968, 85.9.

Source: See Appendix A.

TABLE 6

Rates of Change of Third-Party and Direct Expenditures for Physicians' Services, 1948-68

(per cent per annum continuously compounded)

| Per Capita Expenditures | 1948-56 | 1956-66 | 1966-68 | 1948-68 |
|---|---|---|---|---|
| Third parties . . . . . | 17.7 | 9.4 | 24.2 | 12.5 |
| | (1.4) | (0.2) | (6.0) | (0.5) |
| Patients directly . . . | 0.7 | 5.0 | -5.9 | 3.2 |
| | (0.5) | (0.5) | (3.2) | (0.3) |

Note: Standard errors of rates of change are shown in parentheses.

Source: See Appendix A.

## 1.3 Quantity of Physicians' Services

Deflation of expenditures by average price yields a "quantity" series. This is not necessarily equivalent to a measure of the number of physician visits, since it includes an implicit adjustment for shifts in the type of physician visit and in the amount of auxiliary services (e.g., tests and x-rays) performed at each visit.[6] In effect, the various types of service and types of visits are weighted by their respective price ratios.[7]

This measure of quantity does not take into account any changes over time in the "quality" associated with a given service from a given type of physician. For instance, a routine office visit to a general practitioner would count as the same quantity in 1968 as in 1948 even though the "output," in the sense of improved health, might be different as the result of advances in medical knowledge, new drugs, et cetera. Similarly, the series does not take into account any changes in amenities, physician behavior, or other aspects of service that could affect the utility derived by the patient from the visit.

Table 7 shows that quantity per capita grew at an average annual rate of only 1.8 per cent between 1948 and 1968. Most of the growth of expenditures during that period (7.6 per cent per annum) is accounted for by changes in customary price (3.2 per cent per annum), the ratio of average price to customary price (1.0 per cent per annum), and the size of the population (1.6 per cent per annum).

Comparison of the subperiods reveals some interesting differences. During 1948-56, quantity per capita actually declined at the rate of 0.4 per cent per annum. This decline is not significantly different from a zero rate of change according to conventional statistical tests, but is very significantly different from the 3.0 per cent rate of advance registered during 1956-66. The practical significance of the shift in growth rates is enormous. If quantity per capita had continued to change at its 1948-56 rate after 1956, the average physician would

[6] An analysis of changes in quantity per physician and per visit is presented in section 1.9.

[7] Use of these implicit price weights might be questioned because of imperfections in the market for physicians' services, but there are no alternative data that would permit a more direct approach to weighting different services. Moreover, the errors introduced by imperfect weights are likely to be very small relative to the errors in the original expenditures series.

TABLE 7

Rates of Change of Quantity of Physicians' Services, Personal Income, and Predicted Expenditures and Visits, 1948-68

(per cent per annum continuously compounded)

| | 1948-56 | 1956-66 | 1966-68 | 1948-68 |
|---|---|---|---|---|
| Quantity of services total. . . . . | 1.3 (0.4) | 4.5 (0.3) | 1.9 (0.1) | 3.4 (0.2) |
| per capita. . . . . | -0.4 (0.4) | 3.0 (0.3) | 0.9 (0.1) | 1.8 (0.2) |
| Real disposable personal income per capita . . . . . | 2.2 (0.2) | 2.4 (0.3) | 2.6 (0.1) | 2.2[a] (0.1) |
| Predicted expenditures per capita based on changes in age-sex structure of population | -0.2 | -0.1 | 0.2 | -0.1 |
| Predicted visits per capita based on changes in age-sex structure of population | 0.0 | -0.1 | 0.0 | 0.0 |

Note: Standard errors of rates of change are shown in parentheses.

Source: See Appendix A and Table 8.

[a]The apparent inconsistency between the rate of change for the entire period and the subperiods is due to the fact that this series shows a slight decline from the final years of the first period to the initial years of the second period. Therefore, a line fitted through the period as a whole shows a growth rate no greater than that of the slower of the two subperiods.

have 40 per cent less business today than he actually has. After 1966 the growth rate of quantity per capita fell sharply once more, though we must point out that possible errors in either the expenditures or price series, or both, could introduce substantial errors into the growth rate for a period as short as three years.

In our judgment, the large difference in the growth rate of quantity per capita observed between 1948-56 and 1956-66 cannot be attributed to errors of measurement but represents a true shift in actual utilization of physicians' services. The necessity to explain this shift poses a major problem for health economists, one that has not been adequately resolved by earlier studies. The preceding section demonstrates that the shift cannot be attributed to changes in price or insurance. Next we shall investigate whether it can be attributed to changes in income or in the demographic structure of the population.

## 1.4 Income

Other things being equal, the faster the growth of income, the more rapidly the demand for physicians' services should rise. Table 7 shows that real disposable income per capita did grow more rapidly in 1956-66 than in 1948-56, but the difference is only 0.2 per cent per annum, and not statistically significant. If we assume that the income elasticity[8] for physicians' services is as high as 1.0 (most observers believe it to be less than that [4, 17]), we could attribute 0.2 of a percentage point of the differential change in quantity per capita to changes in the growth of income.

It should be noted that over the entire twenty-year period, real disposable personal income per capita grew more rapidly than did quantity per capita (2.2 per cent versus 1.8 per cent). However, to the extent that growth in expenditures is underestimated through the omission of salaried hospital physicians, so is growth in quantity per capita. It is probable that the quantity of all physicians' services grew at very nearly the same rate as real disposable income.

It has been suggested that, in addition to changes in the average level of income, shifts in the distribution of income could also affect the demand for physicians' services. During the period under study, however, the degree of inequality in personal income was remarkably stable. (See [9], [38].)

## 1.5 Demographic Structure

It is well known that utilization of physicians' services varies with age and sex. Generally speaking, utilization is high in infancy, low during childhood and adolescence, low for males of working age, high for females of childbearing age, and relatively high for both sexes in old age.

In order to determine whether shifts in the demographic structure of the population could account for

[8]The income elasticity of demand is defined as the percentage change in quantity associated with a one per cent change in income.

part of the shift in per capita utilization, either overall or for subperiods, we made two sets of calculations. The percentage of the total population in each of twelve age-sex classes was computed for 1948, 1956, 1966, and 1968. The distributions for each year were then weighted, first by (a) average per capita expenditures for each age-sex class in 1962, and then by (b) average number of per capita visits for each age-sex class in 1963-64.

The results, presented in Tables 7 and 8, indicate that shifts in the age-sex structure of the population probably had a negligible effect on the utilization of physicians' services over the two decades. When the population distribution is weighted by expenditures, the data lead us to expect a 0.1 per cent per annum decline in 1948-56 relative to 1956-66, and when the weighting is done by visits, the reverse is true. We should note, however, a predicted 0.3 per cent per annum faster increase for the 1966-68 period than for 1956-66 when expenditures are used for weights.

## 1.6 Recapitulation: Comparison of 1956-66 with 1948-56

Table 9 provides a brief recapitulation of our attempt to explain differential trends in the first two subperiods. The differential in expenditures growth per capita of 2.5 per cent per annum can be decomposed into a differential in average price (−0.8) and in quantity per capita (3.4).

To explain the differential change in quantity per capita we first consider the movement of net price paid by patients relative to the Consumer Price Index for all goods and services. As explained in section 1.2, this movement was of a kind to decrease demand in 1956-66 relative to 1948-56. In order to arrive at a *minimum* estimate of the unexplained residual, and because of uncertainty regarding the price elasticity of demand, no quantitative estimate is made of this effect. We simply note that it would be in a negative direction.

TABLE 8

Predicted Effects of Changes in Age-Sex Structure of Population on Utilization of Physicians' Services, 1948-68

| Age-Sex Groups | Expenditures[a] (1962 $ per Capita) | Visits (Number per Capita, 1963-64) | 1948 | 1956 | 1966 | 1968 |
|---|---|---|---|---|---|---|
| Males | | | | *Per Cent of Population* | | |
| <5 | $28 | 5.7 | 10.6 | 11.4 | 10.6 | 9.7 |
| 5-14 | 21 | 2.9 | 16.7 | 19.4 | 21.3 | 21.4 |
| 15-24 | 24 | 3.2 | 15.6 | 13.4 | 16.2 | 16.8 |
| 25-44 | 37 | 3.4 | 29.2 | 27.7 | 23.7 | 23.7 |
| 45-64 | 58 | 4.4 | 20.7 | 20.0 | 19.9 | 20.0 |
| ≥65 | 62 | 6.1 | 7.2 | 8.0 | 8.3 | 8.4 |
| Females | | | | | | |
| <5 | 25 | 5.3 | 10.0 | 10.8 | 9.7 | 8.9 |
| 5-14 | 19 | 2.7 | 15.9 | 18.4 | 19.8 | 19.8 |
| 15-24 | 59 | 5.2 | 15.5 | 12.9 | 15.8 | 16.4 |
| 25-44 | 64 | 5.6 | 30.3 | 28.2 | 23.7 | 23.6 |
| 45-64 | 64 | 5.5 | 20.5 | 20.5 | 20.5 | 20.7 |
| ≥65 | 61 | 7.2 | 7.8 | 9.2 | 10.5 | 10.7 |
| | | | | *Predicted Levels* | | |
| *Expenditures*[b] | | | $44.77 | $43.99 | $43.63 | $43.84 |
| *Visits*[c] | | | 4.54 | 4.54 | 4.51 | 4.51 |

Sources: See Appendix A.

[a]Weights based on age groups <6, 6-16, 17-24, 25-44, 45-64, and ≥65 years.
[b]Standardized according to 1962 levels and patterns of expenditures.
[c]Standardized according to 1963-64 levels and patterns of visits.

TABLE 9

Comparison of 1956-66 With 1948-56, Expenditures per Capita and Related Variables

(per cent per annum continuously compounded)

| | 1948-56 | 1956-66 | 1956-66 minus 1948-56 |
|---|---|---|---|
| Expenditures per capita. . . | 4.1 | 6.6 | 2.5[a] |
| Average price. . . . . | 4.4 | 3.6 | -0.8 |
| Customary price . . . | 3.0 | 3.0 | 0.0 |
| Ratio of AP to CP . . | 1.4 | 0.6 | -0.8 |
| Quantity per capita . . . | -0.4 | 3.0 | 3.4[a] |
| *Explanatory variables* | | | *Effects* |
| Net price relative to price of all goods and services . . . . . | | | Negative |
| Real per capita disposable income . . . . . | | | 0.2 |
| Distribution of income . | | | Negligible |
| Age-sex structure . . . . | | | 0.1 |
| Minimum unexplained residual . . . . . | | | 3.1 |

Sources: Tables 2 and 4.

[a]This differs slightly from the sum of its two components because of rounding.

The disposable income effect is based on an observed differential of 0.2 per cent per annum in the growth of per capita real disposable income and an assumption of unitary (1.0) income elasticity of demand. This probably also errs on the conservative side; if, as most observers believe, the income elasticity is below 1.0, the effect would be less than 0.2.

The bases for our estimates of very small effects resulting from changes in distribution of income and age-sex structure are explained in 1.4 and 1.5. Thus, we are left with a minimum unexplained residual of 3.1 per cent, which, we must emphasize, is highly significant in all senses of the term.

## 1.7 Technological Change

Conventional demand variables do not explain the sharp increase in the growth rate of utilization in 1956-66 over the previous period. We believe that some insight into this phenomenon can be gained by an examination of changes in medical technology and of the consequences of these changes for health.

Michael Grossman has shown that the demand for medical care (or any component thereof) can fruitfully be treated as being *derived* from the demand for *health* [22]. Most people do not consume physicians' services as an end in itself but rather for their presumed value in curing disease, relieving pain, et cetera. The degree to which physicians can meet that underlying demand for health is likely to depend upon the state of medical technology. Some advances in medical science might require very little physician input to implement; others might require a great deal. A detailed look at changes in medical technology is beyond the scope of this paper, but a brief review of major innovations is appropriate.

The late 1940's and early 1950's were marked by the introduction and widespread diffusion of many new drugs that were extremely effective against influenza, pneumonia, tuberculosis, and other infectious diseases which had previously played a large role in mortality and morbidity. The advances in drug therapy are well known and need be mentioned only briefly here. Penicillin was discovered in 1928, but mass production and distribution came much later. For instance, between 1945 and 1950 the annual production of penicillin increased from 12,000 to 330,000 pounds [13]. Streptomycin was discovered in 1943 and widespread distribution came several years later. The year 1948 marked the introduction of the first broad spectrum antibiotic, chlortetracycline, and this was soon followed by chloramphenicol. In 1950 oxytetracycline was introduced, and another major broad spectrum antibiotic, tetracycline, appeared in 1953. These antibiotics had a pronounced impact on the length and severity of infectious diseases. The use of para-aminosalicylic acid (late 1940's) and isoniazid (1952) in the treatment of tuberculosis also had considerable effect.

Since 1956, there has not been a similar improvement in the ability of physicians to alter health. Those advances that have occurred, such as renal dialysis, cancer chemotherapy, and open heart surgery, have typically been of a kind that make for only marginal improvements in general health indexes, despite occasionally dramatic effects in particular cases.

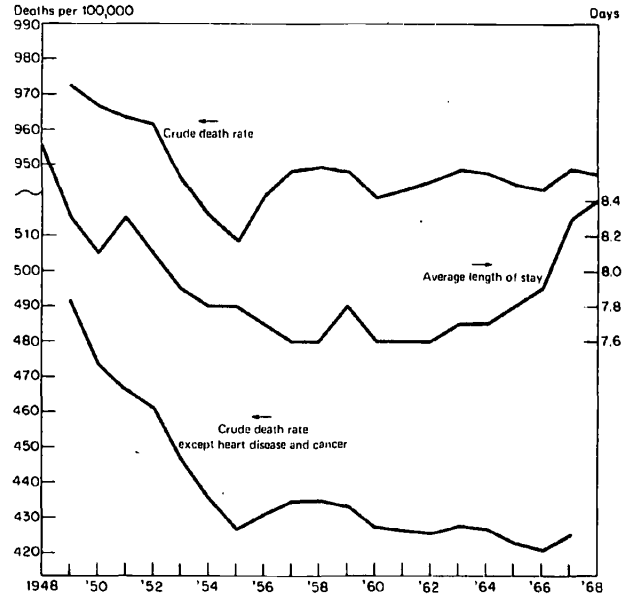
The differential health impact of medical advances in the two periods is implicit in the behavior of death rates

(Table 10 and Chart 3). Mortality declined for several years after 1948, but the decline ended in the middle 1950's. Since then, crude death rates and many of the age-specific rates have tended to remain rather stable. The early declines were particularly dramatic for infectious diseases. They were also relatively greatest for the younger age groups.

In our view the improvement in health prior to 1956 which resulted from application of the new medical technology helps to explain the decline in per capita utilization of physicians' services in those years. The absence of comparable health effects accruing from the medical advances of later years suggests that the demand for physicians' services might have leveled off; the health factor alone, however, cannot account for the marked rise in demand from 1956 to 1966. To understand that, we must also take into consideration the nature of the technological changes. In general, the early advances tended to be physician-saving, while those of the latter period were characteristically physician-using. Physician time was, of course, required for the prescription and administration of the "wonder drugs," but they frequently produced rapid improvement in health, thereby reducing total utilization of physicians' services. Since 1956, most medical advances have required substantial inputs of physician time for their implementation and have not had such pronounced effects on health. The result has been a rapid growth in utilization.

Chart 3

**Indexes of Health, 1948-68**




Note: Data smoothed by three-term moving average.
Source: See Appendix A.

TABLE 10

**Rates of Change of Death Rates and Hospital Use, 1948-68**

**(per cent per annum continuously compounded)**

| | 1948-56[a] | 1956-66 | 1966-68 | 1948-68[a] |
|---|---|---|---|---|
| Death rate, all causes | -0.7 (0.2) | 0.0 (0.1) | n. a. | -0.1 (0.1) |
| Death rate, all causes except heart disease and cancer | -2.0 (0.3) | -0.2 (0.2) | n. a. | -0.6 (0.1) |
| Average length of hospital stay | -1.3 (0.2) | 0.2 (0.1) | 3.1 (1.1) | -0.2 (0.1) |
| Hospital days per capita[b] | 0.4 (0.2) | 1.7 (0.1) | 2.8 (0.9) | 1.3 (0.1) |

Note: Standard errors of rates of change are shown in parentheses.

Source: See Appendix A.

[a] Periods shown for death rates are 1949-56 and 1949-67.
[b] Nonfederal short-term general hospitals.

Evidence supporting our hypothesis can be found in the behavior of the average length of stay in short-term general hospitals. This statistic declined from 8.7 days in 1948 to 7.7 days in 1956. After 1956, average stay leveled off and then started to rise, reaching 7.9 days in 1966.[9] Also, hospital days per capita (admissions times average length of stay) were relatively stable in the first period, but rose appreciably in the second. The population's health did not worsen after 1956, but more cases became treatable and the average time of treatment rose. The increase in hospitalization was associated with increased utilization of physicians' services because the new technology required large inputs of both.

Thus, we postulate a latent demand for health, which appropriate technological change can transform into a market demand for services producing health. It was impossible to purchase a measles vaccination or heart-

[9] The figure reached 8.3 in 1969, but this later increase was probably attributable to Medicare.

lung machine a quarter of a century ago for any price, but as soon as these products were technically available, a market demand for them rapidly materialized. In both periods under review, technological change expanded the range of services physicians offered, and this in itself should have led to a growth in demand for these services. One would expect this growth to be much greater in the second period than in the first because the early advances necessitated only small inputs of physician time to be implemented, while the later ones were highly physician-intensive. The improvement in health that resulted from the early advances was so great that it turned the anticipated slight rise in demand into a slight decline, since healthier people have less objective *need* for the services of physicians. The advances in the second period exerted no significant downward pressure on demand via better health, and the large rise did, in fact, materialize.

One modest test of the technology hypothesis is to look at what was happening to dentists' services during the same period. The factors affecting demand and supply in this market are, in many respects, similar to those affecting physicians' services, the most notable difference being that changes in the two technologies are relatively independent. If dental services showed patterns of change similar to physicians' services, we would be inclined to reject an explanation that gives major importance to advances in medical science. On the other hand, if dental services showed a markedly different pattern of change over time, the emphasis on technological change in medicine would receive some support.

The data presented in Table 11 strongly confirm the latter position. Expenditures, customary fees, quantity per capita, and quantity per dentist all rose more rapidly between 1948 and 1956 than during 1956-66.[10] This is in sharp contrast to physicians' services, where all these variables rose faster after 1956.

TABLE 11

**Rates of Change of Dentists' Services, 1948-68**

**(per cent per annum continuously compounded)**

| | 1948-56 | 1956-66 | 1966-68 |
|---|---|---|---|
| Expenditures | 8.3 | 6.1 | 9.9 |
| Price (fee index) | 3.2 | 2.4 | 5.1 |
| Quantity (deflated expenditures) | 5.1 | 3.7 | 4.8 |
| Quantity per capita | 3.5 | 2.1 | 3.7 |
| Quantity per dentist | 4.1 | 2.7 | n. a. |

Source: See Appendix A.

The deceleration in utilization of dental services may conceivably have been the result of the spread of fluoridation.[11] But even if this is the explanation, it only serves to strengthen the general point—the importance of technological change as a factor explaining secular changes in demand for health services.

## 1.8 The Supply of Physicians

No discussion of utilization of physicians' services can be complete without consideration of changes in the supply of physicians. There is no satisfactory annual series available covering physicians, but the AMA has published figures for certain benchmark years which we can use to calculate rates of change for the period 1949-67 and to estimate rates of change for the two major subperiods we are concerned with.[12]

According to Table 12, the number of active physicians per capita in the United States increased by almost 14 per cent from 1949 to 1967. The rate of increase, however, was very uneven by type of physician and type of practice. Particularly noteworthy was the decline in the percentage of physicians in private practice from 78.5 per cent in 1949 to 65.5 per cent in 1967. This was partly the result of a sharp increase in the relative importance of teaching, research, and other nonpatient-care activities. More important in absolute terms was the growth of salaried physicians in hospitals, including interns, residents, fellows, and regular full-time staff members. The rapid growth of specialists and the absolute decline in the number of general practitioners per capita should also be noted.

[10] The rapid increase in quantity per dentist in the first period might be attributable to the introduction of high speed drills.

[11] In 1948 fewer than half a million people were served by fluoridated water systems. By 1956 the figure had risen to 33 million, and by 1966, to 62 million. If several years of exposure to fluoridated water are required before the full impact on dental health is manifest, it is possible that fluoridation had a larger impact in the later than in the earlier period. See [51].

[12] 1949-57 is used as an approximation for 1948-56 and 1957-67 is used as an approximation for 1956-66.

TABLE 12

U.S. Physicians, by Type, Selected Years, 1949-67

| | Number of Physicians per 100,000 | | | | Per Cent of Total Active Physicians | | | |
|---|---|---|---|---|---|---|---|---|
| | 1949 | 1957 | 1963 | 1967 | 1949 | 1957 | 1963 | 1967 |
| Total active physicians | 129.8 | 126.8 | 137.8 | 147.4 | 100.0 | 100.0 | 100.0 | 100.0 |
| Federal | 8.5 | 9.8 | 10.2 | 12.3 | 6.5 | 7.7 | 7.4 | 8.3 |
| Nonfederal | 121.3 | 117.0 | 127.6 | 135.1 | 93.4 | 92.3 | 92.6 | 91.7 |
| Other than patient care | 2.5 | 4.2 | 6.8 | 8.7 | 1.9 | 3.3 | 4.9 | 5.9 |
| Patient care | 118.8 | 112.8 | 120.8 | 126.4 | 91.5 | 89.0 | 87.7 | 85.8 |
| Hospital service | 16.9 | 21.3 | 25.3 | 29.9 | 13.0 | 16.8 | 18.4 | 20.3 |
| Private practice | 101.9 | 91.5 | 95.5 | 96.5 | 78.5 | 72.2 | 69.3 | 65.5 |
| General practitioners | 64.7 | 47.8 | 36.5 | 31.8 | 49.8 | 37.7 | 26.5 | 21.6 |
| Full-time specialists | 37.2 | 43.7 | 59.0 | 64.7 | 28.7 | 34.5 | 42.8 | 43.9 |

Source: See Appendix A.

When we consider changes in the number of private practice physicians per capita in the subperiods, we find a large difference between 1949-57 and 1957-67 (Table 13). The first subperiod shows a rate of change of −1.3 per cent per annum; the second shows an average annual increase of 0.5 per cent. The differential is even greater if we take account of the shift to specialists by treating them as the equivalent of 1.2 general practitioners. This weight is equal to the ratio of annual receipts of the average specialist relative to those of the average G.P. After this adjustment, we find that the differential in the rate of change between the two subperiods was on the order of 2.0 per cent per annum.

This change differential in the supply of physicians probably accounts for a portion of the unexplained differential in the growth of quantity per capita.[13] It must be stressed that the differential in supply can properly be treated as exogenous in this context (i.e., it is not the result of contemporaneous changes in demand). The number of physicians in practice in any year is largely determined by decisions made more than a decade previously.

What is the mechanism by which additional supply generates additional utilization? In "normal" economic markets this occurs via price. The increase in supply depresses price and the lower price induces an increase in the quantity demanded until a new equilibrium is reached. To some extent this mechanism may also be operative in the market for physicians' services. Part of the "cost" of using a physician is the time and trouble involved in making an appointment, getting to his office, waiting, and the like. As the supply increases, this part of the cost tends to decrease, thus encouraging additional use. We hypothesize that in this particular market another force is also at work, namely, the ability of the

TABLE 13

Average Annual Rates of Change of Private Practice Physicians, 1949-67

(per cent per annum continuously compounded)

| | 1949-57 | 1957-67 | 1949-67 |
|---|---|---|---|
| Private practice physicians per capita | -1.3 | 0.5 | -0.3 |
| Weighted private practice physicians per capita (Specialists = 1.2 G.P.'s) | -1.1 | 0.9 | 0.0 |

Note: Rates of change from initial to terminal year.

Source: See Appendix A.

[13] See Part 2 for a test of this hypothesis.

physician to directly influence the demand for his own services. The data we have examined cannot prove the validity of this hypothesis but are certainly consistent with it.

We know that there was a large increase in the rate of change in utilization during 1956-66 compared with 1948-56. We also know that there was a substantial independent increase in the rate of change in supply during the same period. The growth of utilization did not result from the downward pressure of supply on price (movement along the demand curve), nor can it be attributed to shifts in the demand curve as a result of differential changes in income, insurance, or demographic structure. It seems to us very plausible that, instead, it was partly attributable to a physician-induced growth in demand and partly to the technologically-inspired growth in demand discussed in the previous section.

## 1.9 Quantity per Physician

The preceding discussion of changes in quantity of physicians' services per capita and number of physicians per capita makes it apparent that the quantity of service produced by each physician was not static during the period under study. The purpose of this section is to identify the various elements that contributed to the change in quantity per physician. Unfortunately, a paucity of reliable data on number of visits per physician makes it impossible to carry out this analysis for the subperiods.

We see in Table 14 that between 1948 and 1968 quantity per physician grew at an average annual rate of 2.1 per cent. This increase was not attributable in any measure to a larger number of visits per physician. In fact, the number of visits per physician seems to have declined slightly. What we observe is, rather, a considerable increase in the quantity of service supplied per visit.

This increase of 2.8 per cent per annum can be explained in part by the growth of specialization. It is well established that specialists have higher average receipts per visit than general practitioners (albeit they have fewer visits per week). The higher receipts per visit are the result of three factors. First, most specialists charge more for their own time than most general practitioners. Second, a visit to a specialist often involves more physician time. Finally, a visit to a specialist usually is accompanied by more auxiliary services, such as electrocardiograms, blood tests, and x-rays. On the basis of statistics published in *Medical Economics*, we have calculated that the average visit to a specialist results in nearly twice as much total expenditure (physician receipts) as the average visit to a G.P. ($10.55 versus $5.48 in 1966). A routine office visit to a specialist results in an expenditure of about 50 per cent more than a routine office visit to a G.P., ($6.35 versus $4.31 in 1966), and the cost of supplementary care received during an average visit to a specialist is about 260 per cent greater than that provided during a G.P. visit.[14]

TABLE 14

Statistical Analysis of Rate of Change in Quantity of Service per Physician, 1948-68

| | Average Annual Rate of Change, per cent 1948-68 |
|---|---|
| Quantity per physician | 2.1 |
| Visits per physician | -0.7 |
| Quantity per visit | 2.8 |
| Shift to specialists[a,b] | 0.9 |
| Quantity per visit adjusted for shift to specialists | 1.9 |

Note: Rate of change of number of physicians based on 1949-67.

Source: See Appendix A and Tables 1, 3, 12, and 13.

[a] Based on change in distribution of visits between general practitioners and specialists and ratio of receipts for each type of visit.

[b] 1947-66 growth rate.

As the percentage of physicians who are specialists grows, it is natural to expect some increase in quantity per visit. Furthermore, the last line of Table 14 shows that even after the shift towards specialization is taken into account, a substantial increase remains, which

[14] The *Medical Economics* statistics employed in these calculations pertain to annual gross receipts, visits per week, weeks worked per year, and standard fees for the routine office visits, for G.P.'s and for most categories of specialists. Multiplying the standard fee charged by the 1966 ratio of average price to customary price yields an average receipts figure for the routine office visit.

probably reflects the increased use of tests, x-rays, and other procedures by physicians of both types.

## 1.10 Analysis of Average Price

It has been shown that a large part of the increase in expenditures per capita is attributable to the increase in average price. In Table 15 we present a statistical analysis of some of the factors that might explain this price rise.

The most obvious explanatory variable is the rise in the general price level. Other things being equal, there is no reason to expect physicians' prices to remain stagnant while the rest of the economy is experiencing inflation. We see that the changes in the general price level, as measured by the Consumer Price Index, do explain part of the increase in the price of physicians' services, but neither for the subperiods nor for the period as a whole do they explain even as much as half of the increase.

A second major explanatory variable is differential movements in productivity. A widely accepted generalization in economics is that sectors with relatively low rates of growth of output per man have relatively rapid increases in price, and vice versa. For the nine major sectors of the economy the rank correlation between changes in price and changes in output per man, 1947-65, was −0.93 [18]. The reason for this is that compensation for the factors of production must, in the long run, increase at about the same rate in all sectors. Those with slow productivity growth need rapid price increases in order to generate enough revenue to pay for the capital and labor they employ. Conversely, if an industry or sector with rapid productivity growth did not have a slow growth of prices (or a decline), very large profits would be generated; new competitors would be attracted to the industry and existing ones would try to expand output, and the resulting increase in supply would tend to drive prices down.

The differential change in productivity here is estimated by comparing quantity per physician with real gross national product per person engaged.[15] For the period as a whole, productivity in the total economy rose somewhat faster than in the physician sector (2.5 per cent versus 2.1 per cent per annum), but after taking this into account we still find an unexplained rise in average price of physicians' services of 2.1 per cent per annum.

The size of the unexplained excess rise in average price varies considerably among the subperiods. During 1948-56, movements in the general price level and the differential in productivity explain nearly all of the rise in average price. The excess is much greater in 1956-66, and greater still in 1966-68.

The excess rise in the price of physicians' services implies that physicians were probably improving their relative income position. Some fragmentary data lend support to this conclusion. According to *Medical Economics*, the median net income of physicians from self-employment practice rose 17 per cent from 1966 to 1968. IRS data show a rise in average net business receipts per physician of 19 per cent during that two-year span.

TABLE 15

**Statistical Analysis of Rate of Change in Average Price of Physicians' Services, 1948-68**

(per cent per annum)

| | 1948-56 | 1956-66 | 1966-68 | 1948-68 |
|---|---|---|---|---|
| Average price | 4.4 | 3.6 | 8.1 | 4.2 |
| CPI, all goods and services | 1.8 | 1.5 | 3.5 | 1.7 |
| Excess of average price over general price level | 2.6 | 2.1 | 4.6 | 2.5 |
| Differential change in productivity[a] | 1.7 | 0.4 | 0.6 | 0.4 |
| Unexplained rise in average price | 0.9 | 1.7 | 4.0 | 2.1 |

Source: See Appendix A and Tables 4 and 14.

[a] Differential change in productivity is derived as follows:

| | 1948-56 | 1956-66 | 1966-68 | 1948-68 |
|---|---|---|---|---|
| Real GNP per person engaged | 2.7 | 2.8 | 1.3 | 2.5 |
| Minus: quantity per physician | 1.0 | 2.4 | 0.7 | 2.1 |
| Equals: differential change in productivity | 1.7 | 0.4 | 0.6 | 0.4 |

## 1.11 The 1966-68 Subperiod

The years since 1966 have witnessed an extremely rapid rise in expenditures for physicians' services.

[15] "Persons engaged" is a measure of all employed and self-employed persons in the United States adjusted to a full-time equivalent basis.

Because of the short time span, the paucity of data, and the likelihood that some of the data now available will be revised, a full-scale attempt to analyze this subperiod is not yet warranted. We do feel obliged, however, to call attention to some major departures in recent years from the trends of 1956-66, and to suggest a few tentative explanations.

The first major point to be noted about 1966-68 compared with the preceding decade is that the increase in average price was extremely rapid and accounted for almost all of the increase in per capita expenditures. Whereas quantity per capita had been rising at an average annual rate of 3.0 per cent, the rate of growth fell to 0.9 per cent in 1966-68. The rapid growth of third-party payments during this period meant that the net price to the patient declined relative to other prices; we might, therefore, have expected a rise in the quantity demanded on that account. Trends in income and age-sex structure also were in the direction of increasing demand.

Assuming that the figures are correct, we can see that there was a sharp falling off in the growth rate of quantity per physician from 1966 to 1968. One plausible explanation for the simultaneous sharp decrease in the growth rate of utilization may have been a weakened incentive on the part of physicians to actively cultivate a market for their services in the face of rapid price increases (8.1 per cent per annum as opposed to 3.6 per cent during the previous decade). Such a diminution in physician-induced demand growth is what we would expect with a supply function negatively related to average price, i.e., a backward-bending supply curve. In other words, the advent of Medicare and Medicaid produced a sharp increase in demand; physicians responded by raising their prices. This price increase, far from inducing physicians to work more, made it possible for them to earn higher incomes while actually working less.

The speculative nature of this account must be emphasized; in order to make a more definitive analysis we need more data and a longer time period for study. Statistics on hours and weeks worked by each physician would be particularly helpful. Also, it should be noted that the increased paperwork associated with third-party payment may have been partly responsible for the relative stagnation in quantity per physician. It does seem likely, however, that the vast sums of money poured into physicians' services by the government in recent years served to increase the incomes of physicians (and possibly to redistribute their services) rather than to call forth an increase in overall quantity of their services. To the extent that physicians were already working up to their capacity in 1966, this result was almost inevitable, since the supply of physicians responds, if at all, only after a long lag.