

An accounting framework is offered for analyzing the increase in expenditures for physicians' services, dental services, and short-term hospital care. This analysis raises significant questions concerning the data involved, and is a prerequisite for further studies.

ACCOUNTING FOR THE RISE IN SELECTED MEDICAL CARE EXPENDITURES, 1929-1969

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Introduction

THE problem to which this paper is addressed is this: given the increase that has taken place in each category of health services expenditures, what are the respective contributions of the several related factors? Beginning with the simplest formulation—expenditures = price \times per capita utilization \times population—we have proceeded to take other factors into account as data became available. Most important among these additional factors are the aging of the population and improved collection of fees by physicians. We have also tested alternative measures of price or unit cost, some old and some new, particularly for hospital services. In this paper we shall summarize the method we employ, present our findings to date, and discuss their implications for policy, for analysis, and even for the basic data themselves.

We are analyzing three categories of expenditures—for dental services, physician services, and short-term hospital care. In every case the period is 1929-1968, with data presented annually for the 1960s and for selected years before that. In order to draw a sharper focus on July 1, 1966, when Medicare went

into effect, we also present data for fiscal years 1965-1969.

Both academics and government officials have examined this type of question in recent years.^{1,4,8,14} Typically, they present a percentage distribution of the increase in expenditures over one- or two-year intervals among price change, population growth, and change in per capita use; or they present the same material in the form of annual rates of change for each factor. The distinctive features of this paper are disaggregation below the level of total health services expenditures, on the one hand, and the simultaneous examination of more than a single category of health services expenditures, on the other hand; the compilation of a systematic series of basic data on expenditures, prices, and other factors; and the intensive application of a particular method to the further decomposition of the initial factors, as permitted by the availability of new data.

Method

As a technical problem, accounting for the rise in expenditures for a category of health services is the same as accounting for economic growth in the

Table B-1—Population by age, United States,* selected calendar years, 1929-1968 and fiscal years, 1965-1969

(thousands)				
Year	Total	Under age 65	Age 65 and over	
			Number	Per cent of total
Calendar years (July 1)				
1929	123,731	117,158	6,573	5.3
1935	129,598	121,682	7,916	6.1
1940	134,591	125,460	9,131	6.8
1950	154,675	142,159	12,516	8.1
1955	168,385	153,739	14,646	8.7
1960	183,246	166,458	16,788	9.2
1961	186,367	169,223	17,144	9.2
1962	189,321	171,873	17,448	9.2
1963	192,156	174,451	17,705	9.2
1964	194,924	176,921	18,003	9.2
1965	197,472	179,156	18,316	9.3
1966	199,843	181,222	18,621	9.3
1967	202,099	183,143	18,956	9.4
1968	204,173	184,882	19,291	9.4
Fiscal years (January 1)				
1965	196,327	178,151	18,176	9.3
1966	198,769	180,260	18,509	9.3
1967	201,078	182,250	18,828	9.4
1968	203,248	184,094	19,154	9.4
1969	205,298	185,810	19,488	9.5

* Includes armed forces overseas, civilian resident population of outlying areas, and federal civilian employees abroad.

Source: Bureau of the Census, various publications.

economy at large, or for an increase in the number of births. Two or more factors are involved and they interact. Over time, the interaction term gets larger and larger. The treatment of this term has posed an intractable technical problem for many scholars, who have disposed of it arbitrarily and variously.

The importance of treating the interaction term assumed prominence in the analysis of the Russian economic growth in the 1950s¹³; and in the early 1960s Denison proposed and applied the solution, namely, to reduce the size of all numbers by calculating average annual rates of growth for each time interval, whatever its length.⁵ As a result, the size of the interaction term is markedly reduced and virtually eliminated.

Another property of this method is that one more factor can always be calculated from the factors for which data are available, if these are first converted into index numbers. Thus, annual rates of change in utilization can be computed from expenditures and price data alone, even in the absence of direct data on utilization.

We have prepared a set of five tables for each expenditures category; only three tables in each set are presented here, in addition to Table B-1 on U.S. population by age. The remaining two sets of tables together with appendix tables and an appendix on alternate methods of treating interaction terms are presented in a more detailed report pub-

Table D-1—Basic data: expenditures and fees for dental services, United States, selected calendar years, 1929-1968, and fiscal years 1965-1969

Year	Expenditures (millions)	Dentists' fee index
		(1957-59=100)
Calendar years		
1929	\$ 482	55.9
1935	302	52.0
1940	419	53.5
1950	975	81.5
1955	1,525	93.1
1960	1,977	104.7
1961	2,067	105.2
1962	2,234	108.0
1963	2,277	111.1
1964	2,648	114.0
1965	2,808	117.6
1966	2,964	121.4
1967	3,360	127.5
1968	3,612	134.5
Fiscal years		
1965	2,728	117.4
1966	2,866	119.0
1967	3,158	124.4
1968	3,490	131.0
1969	3,719	138.5

Source: Expenditures—Social Security Administration: Calendar years: 1929-66, R & S Note No. 16, 9/29/69, 1967-68, R & S Note No. 18, 11/7/69; Fiscal years: 1965-66, R & S Note No. 12, 11/11/68, 1967-69, R & S Note No. 18, 11/7/69; Fee Index—Bureau of Labor Statistics, Consumer Price Index, published and unpublished data.

lished by the Social Security Administration.¹²

The first set of tables (D-1, P-1, and H-1) present the basic data on expenditures, the applicable medical care component of the Consumer Price Index, and additional relevant factors for which data are available. The next step (not presented here) is the conversion of the basic data into index numbers. The reason for this step is to obtain a series on per capita utilization. In the subsequent tables this item is called "all other," denoting the combination of quantity and quality of output, which

cannot be disentangled except through the employment of external data. It should be noted that "all other" is an additional factor which has no counterpart in Tables D-1, P-1 and H-1 but is retained in all subsequent tables in this series. "All other" is computed as the quotient of the index of expenditures divided by the product of the indexes of prices and population.

The base years are 1935 for calendar-year data and 1965 for fiscal-year data. These are selected arbitrarily.

The percentage changes for whatever intervals are selected were then com-

Table P-1—Basic data: expenditures for physicians' services, fees, and related factors, United States, selected calendar years, 1929-1968, and fiscal years, 1965-1969

Year	Expenditures (millions)	Physicians' fee index (1957-59=100)	CPI, all items (1957-59=100)	Collection percentage	Expenditures ratio, aged to young
Calendar years					
1929	\$ 1,005	55.7	59.7	82	1.5
1935	774	53.9	47.8	74	1.5
1940	973	54.5	48.8	80	1.5
1950	2,755	76.0	83.8	86	1.5
1955	3,680	90.0	93.3	90	1.5
1960	5,684	106.0	103.1	92	1.6
1961	5,895	108.7	104.2	91	1.6
1962	6,498	111.9	105.4	91	1.6
1963	6,891	114.4	106.7	91	1.6
1964	8,065	117.3	108.1	92	1.6
1965	8,745	121.5	109.9	92	1.6
1966	9,156	128.5	113.1	92	1.8
1967	10,287	137.6	116.3	92	1.9
1968	11,562	145.3	121.2	92	2.0
Fiscal years					
1965	8,400	119.1	108.9	92	1.60
1966	8,865	124.1	111.2	92	1.65
1967	9,738	133.4	114.7	92	1.85
1968	10,919	141.5	118.5	92	1.95
1969	11,916	150.1	124.2	92	2.00

Sources: Expenditures—Social Security Administration, Office of Research and Statistics, Calendar years: 1929-66, R & S Note No. 16, 9/29/69, 1967-68, R & S Note No. 18, 11/7/69; Fiscal years: 1965-66, R & S Note No. 12, 11/11/68, 1967-69, R & S Note No. 18, 11/7/69. Fee Index—Bureau of Labor Statistics, Consumer Price Index, published and unpublished data. Collection percentage and Expenditures ratio—Social Security Administration, Office of Research and Statistics, Staff Paper No. 4, Tables 24, 25.

Table H-1—Basic data: expenditures for short-term hospital care, daily service charges, and related factors, United States, selected calendar years, 1929-1968, and fiscal years, 1965-1969

Year	Expenditures (millions)	Daily service charge CPI (1957-59=100)	Expense per patient-day AHA	Expenditures per inpatient day	Expenditures per adjusted patient-day		Expenditures ratio, aged to young	CPI, all items (1957-59=100)
					1 to 4	1 to 5		
Calendar years								
1929	\$ 380	24.2	\$ 4.39	\$ 4.53	\$ 4.35	\$ 4.39	NA	59.7
1935	414	23.8	4.62	4.76	4.41	4.48	NA	47.8
1940	551	25.4	5.31	5.47	5.12	5.19	NA	48.8
1950	2,234	57.8	15.91	16.46	15.44	15.64	2.2	83.8
1955	3,640	83.0	23.38	24.51	22.48	22.86	2.2	93.3
1960	6,032	112.7	32.92	34.55	31.55	32.10	2.2	103.1
1961	6,573	121.3	35.44	36.79	33.57	34.17	2.2	104.2
1962	7,154	129.8	37.35	38.52	35.17	35.80	2.2	105.4
1963	7,998	138.0	39.58	41.31	37.19	37.95	2.2	106.7
1964	8,759	144.9	42.30	43.51	39.08	39.89	NA	108.1
1965	9,545	153.3	45.40	46.41	41.72	42.58	NA	109.9
1966	11,211	168.0	49.63	52.24	46.47	47.52	3.0	113.1
1967	13,287	200.1	55.90	59.48	52.96	54.15	3.4	116.3
1968	15,418	226.6	NA	66.83	59.47	60.81	3.7	121.2
Fiscal years								
1965	9,183	148.3	44.48	44.65	40.13	40.96	NA	108.9
1966	10,251	158.3	48.15	47.76	42.49	43.45	2.9	111.2
1967	12,392	184.5	54.08	55.47	49.39	50.50	3.1	114.7
1968	14,301	213.0	61.38	61.99	55.16	56.41	3.6	118.5
1969	16,831	241.1	NA	NA	NA	NA	NA	124.2

Sources: Social Security Administration, Bureau of Labor Statistics, American Hospital Association (see Social Security Administration, Office of Research and Statistics Staff Paper No. 4).

puted; these figures are also omitted here. It would be possible to proceed directly to this step from Tables D-1, P-1, and H-1, if data were available for all the related factors.

The data were then converted into average annual rates of change (geometric averages) for the same intervals and are presented in Tables D-2, P-2, and H-2. It will be noted that the sums of the several factors in these tables equal or approach closely the figure in the expenditures column.

One may stop here and examine the findings or proceed to Tables D-3, P-3, H-3, which present the percentage distribution of the increase in expenditures

among the several factors. The percentage distributions are also converted into dollar amounts to permit the later aggregation of the contributions of each factor to the increase in expenditures for two or more health services categories.

Findings

Dental Services Expenditures

We shall begin with the simplest case: that of accounting for the rise in dental service expenditures. Table D-2 indicates that, over the long period 1929-1968, expenditures for dental services rose at 5.3 per cent annually. There

Table D-2—Annual percentage rates of change: expenditures and fees for dental service, United States, selected intervals, 1929-1969

Interval	Expenditures	Fee index	Population	All other
Calendar years				
1929-68	5.3	2.3	1.3	1.6
1929-40	-1.3	-0.4	0.8	-1.7
1940-50	8.8	4.3	1.4	2.9
1950-60	7.3	2.5	1.7	2.9
1960-68	7.8	3.2	1.4	3.1
1929-35	-7.5	-1.2	0.8	-7.1
1935-40	6.8	0.6	0.8	5.4
1950-55	9.4	2.7	1.7	4.7
1955-60	5.3	2.4	1.7	1.2
1960-65	7.3	2.4	1.5	3.3
1966-68	10.4	5.3	1.1	3.8
1960-61	4.6	0.5	1.7	2.3
1961-62	8.1	2.7	1.6	3.6
1962-63	1.9	2.9	1.5	-2.3
1963-64	16.3	2.6	1.4	11.7
1964-65	6.0	3.2	1.3	1.5
1965-66	5.6	3.2	1.2	1.0
1966-67	13.4	5.0	1.1	6.7
1967-68	7.5	5.5	1.0	0.9
Fiscal years				
1965-66	5.1	1.4	1.2	2.4
1966-67	10.2	4.5	1.2	4.2
1967-68	10.5	5.3	1.1	3.8
1968-69	6.6	5.7	1.0	-0.2

Source: Derived from Table D-1.

has been considerable variation about this figure, however, with a decline taking place during the Great Depression and a high rate of increase (9.4%) in the early 1950s. The latter figure is considerably above that for the late 1950s or early 1960s. In recent years the rate of increase has exceeded the long-run average. Too much weight cannot be attached to the final interval, calendar years 1967-1968 and fiscal years 1968-1969, because the estimates for the last year are preliminary.

With respect to the basic data themselves, one other aspect is also interesting. The increase in 1962-1963 is exceedingly small, raising questions con-

cerning the expenditures figures for these years. It is noted that, beginning in 1963, dental expenditures were derived from the gross receipts of dentists reported to the Internal Revenue Service on income tax returns. The transition to more reliable data resulted in a discontinuity in the expenditures series.

Prices for dental services, i.e., dental fees, have risen at an annual rate of 2.3 per cent over the entire 39-year period. In recent years the rise has been more than double the long-run rate. It has tended to exceed the rate of increase in the Consumer Price Index (CPI) as a whole, but not by much.

The population factor applies, of course, to all the categories of health services expenditures. It has increased at 1.3 per cent for the entire 39-year period, although at a lower rate in the 1930s and in the late 1960s.

As a result, "all other," representing a combination of the per capita use of services and the quality of services, has increased at an annual rate of 1.6 per cent over the 39-year period. Again there was a decline in the early 1930s, with the highest rate of increase taking place in the early 1950s.

The declines in "all other" shown for 1962-1963 (calendar years) and 1968-1969 (fiscal years) are perhaps questionable. For the former, the basic expenditures figure is at issue; for the latter, the problem may lie in the procedure for estimating fiscal year expenditures.

If the figures are accepted as given, then in the long period prices account for 44 per cent of the rise in dental services expenditures. The contribution of price rise was relatively smaller in the early 1950s (30%) when the growth in expenditures was greatest.

Physicians' Services Expenditures

Table P-1 presents data on physicians' expenditures and fees. Two more

Table P-2—Annual percentage rates of change: expenditures for physicians' services, fees, and related factors, United States, selected intervals, 1929-1969

Interval	Expenditures	Fee index	Population	All other	Collection percentage	Aging factor	CPI, all items
Calendar years							
1929-68	6.5	2.5	1.3	2.6	0.3	0.2	1.8
1929-40	-0.3	-0.2	0.8	-0.9	-0.2	0.1	-1.8
1940-50	11.0	3.4	1.4	5.9	0.7	0.1	5.6
1950-60	7.5	3.4	1.7	2.2	0.7	0.1	2.1
1960-68	9.3	4.0	1.4	3.6	0.0	0.5	2.0
1929-35	-4.2	-0.5	0.8	-4.5	-1.7	0.1	-3.7
1935-40	4.7	0.2	0.8	3.7	1.6	0.1	0.4
1950-55	6.0	3.4	1.7	0.7	0.9	0.0	2.2
1955-60	9.1	3.3	1.7	3.8	0.4	0.2	2.0
1960-65	9.0	2.8	1.5	4.5	0.0	0.0	1.3
1966-68	12.4	6.3	1.1	4.6	0.0	0.9	3.5
1960-61	3.7	2.5	1.7	-0.6	-1.1	0.0	1.1
1961-62	10.2	2.9	1.6	5.4	0.0	0.0	1.2
1962-63	6.0	2.2	1.5	2.2	0.0	0.0	1.2
1963-64	17.0	2.5	1.4	12.5	1.1	0.0	1.3
1964-65	8.4	3.6	1.3	3.3	0.0	0.1	1.7
1965-66	4.7	5.8	1.2	-2.2	0.0	1.7	2.9
1966-67	12.4	7.1	1.1	3.7	0.0	1.0	2.8
1967-68	12.4	5.6	1.0	5.4	0.0	0.8	4.2
Fiscal years							
1965-66	5.5	4.2	1.2	0.0	0.0	0.5	2.1
1966-67	9.8	7.5	1.2	1.0	0.0	1.8	3.2
1967-68	12.1	6.1	1.1	4.6	0.0	0.9	3.3
1968-69	9.1	6.1	1.0	1.9	0.0	0.5	4.8

Source: Derived from Table P-1.

factors appear in this table than in Table D-1: the proportion of physicians' collections to charges, and the ratio of per capita expenditures for physicians' services by persons 65 years and over to per capita expenditures by persons under age 65. The Consumer Price Index (all items)—which is a measure of inflation in the economy as a whole—is also shown. The sources of the additional data are *Medical Economics* for the collection ratio; the Health Information Foundation and the Social Security Administration for the aged to young

per capita expenditures ratio; and the Bureau of Labor Statistics for the overall CPI.

Table P-2 shows the annual rates of change for each factor for the same intervals as dental services expenditures, and Table P-3 distributes the increase in expenditures among the fee, population, and "all other" factors in terms both of percentages and dollar amounts.

For the period 1929-1968, expenditures for physicians' services rose at 6.5 per cent annually. There was a decline between 1929 and 1935, followed by an

increase. In the 1940s the average annual rate of increase in expenditures was 11 per cent, but it was lower in the 1950s and the first part of the 1960s. In recent years the rate of increase has been approximately double the long-run rate.

The figure for the interval 1963-1964 is out of line with the other figures. It may be that reported expenditures for 1963 are too low. The pattern of changes in recent years is different for the calendar-year data from the fiscal-year

data, for which the preliminary nature of the terminal year estimates may be largely responsible. However, since Medicare went into effect on July 1, 1966, fiscal-year comparisons may be more appropriate in the short period. On the other hand, the fiscal-year data on expenditures are estimated from the original calendar-year data, and a more steeply inclined interpolation formula may be indicated. The calendar-year expenditures figures also lead to a decline in "all other" for at least one re-

Table H-2—Annual percentage rates of change: expenditures for hospital care, daily service charges, and related factors, United States, selected intervals, 1929-1969

Interval	Expenditures	Daily service charge, CPI	Population	All other	Expense per patient-day	Expenditures per inpatient day	Expenditures per adjusted patient-day		Aging factor	CPI, all items
							1 to 4	1 to 5		
Calendar years										
1929-68	10.0	5.9	1.3	2.5	6.9	7.1	6.9	7.0	NA	1.8
1929-40	3.4	0.4	0.8	2.2	1.7	1.7	1.5	1.5	NA	-1.9
1940-50	15.0	8.6	1.4	4.5	11.6	11.6	11.7	11.7	NA	5.6
1950-60	10.4	6.9	1.7	1.6	7.5	7.7	7.4	7.5	0.1	2.1
1960-68	12.4	9.1	1.4	1.7	NA	8.6	8.2	8.3	1.5	2.0
1929-35	1.4	-0.3	0.8	0.9	0.9	0.8	0.2	0.3	NA	-3.7
1935-40	5.9	1.3	0.8	3.7	2.8	2.8	3.0	3.0	NA	0.4
1950-55	10.3	7.5	1.7	0.8	8.0	8.3	7.8	7.9	0.1	2.2
1955-60	10.6	6.3	1.7	2.3	7.1	7.1	7.0	7.0	0.1	2.0
1960-65	9.6	6.4	1.5	1.5	6.6	6.1	5.7	5.8	NA	1.3
1966-68	17.3	16.1	1.1	-0.1	NA	13.1	13.1	13.1	2.8	3.5
1960-61	9.0	7.6	1.7	-0.5	7.7	6.5	6.4	6.4	0.0	1.1
1961-62	8.8	7.0	1.6	0.1	5.4	4.7	4.8	4.8	0.0	1.2
1962-63	11.8	6.3	1.5	3.6	6.0	7.2	5.7	6.0	0.0	1.2
1963-64	9.5	5.0	1.4	2.8	6.9	5.3	5.1	5.1	NA	1.3
1964-65	9.0	5.8	1.3	1.7	7.3	6.7	6.8	6.7	NA	1.7
1965-66	17.5	9.6	1.2	5.9	9.3	12.6	11.4	11.6	NA	2.9
1966-67	18.5	19.1	1.1	-1.6	12.6	13.9	14.0	14.0	3.4	2.8
1967-68	16.0	13.2	1.0	1.4	NA	12.4	12.3	12.3	2.3	4.2
Fiscal years										
1965-66	11.6	6.7	1.2	3.3	8.2	7.0	5.9	6.1	NA	2.1
1966-67	20.9	16.6	1.2	2.5	12.3	16.1	16.2	16.2	1.5	3.2
1967-68	15.4	15.5	1.1	-1.1	13.5	11.8	11.7	11.7	4.2	3.3
1968-69	17.7	13.2	1.0	2.9	NA	NA	NA	NA	NA	4.8

Source: Derived from Table H-1.

Table D-3—Factors accounting for increase in expenditures: percentage distribution and dollar amounts for dental services, United States, selected years, 1929-1969

Interval	Percentage distribution				Dollar amounts (millions)			
	Expenditures	Fee index	Population	All other	Expenditures	Fee index	Population	All other
Calendar years								
1929-68	100.0	44.2	25.0	30.8	\$ 3,130	\$1,383	\$783	\$964
1929-40	100.0	-30.8	61.5	-13.07	-63	-19	38	-82
1940-50	100.0	50.0	16.3	33.7	556	278	91	187
1950-60	100.0	35.2	23.9	40.9	1,002	353	239	410
1960-68	100.0	41.5	18.2	40.3	1,635	678	298	659
1929-35	100.0	-16.0	10.7	-94.7	-180	-29	19	-170
1935-40	100.0	8.8	11.8	79.4	117	10	14	93
1950-55	100.0	29.7	18.7	51.6	550	163	103	284
1955-60	100.0	45.3	32.1	22.6	452	205	145	102
1960-65	100.0	33.3	20.8	45.9	831	277	173	381
1966-68	100.0	52.0	10.8	37.2	648	337	70	241
1960-61	100.0	11.1	37.8	51.1	90	10	34	46
1961-62	100.0	34.2	20.2	45.6	167	57	34	76
1962-63	100.0	138.1	71.4	-109.5	43	59	31	-47
1963-64	100.0	16.6	8.9	74.5	371	62	33	276
1964-65	100.0	53.3	21.7	25.0	160	85	35	40
1965-66	100.0	59.3	22.2	18.5	156	92	35	29
1966-67	100.0	39.1	8.6	52.3	396	155	34	207
1967-68	100.0	74.3	13.5	12.2	252	187	34	31
Fiscal years								
1965-66	100.0	28.0	24.0	48.0	138	39	33	66
1966-67	100.0	45.5	12.1	42.4	292	133	35	124
1967-68	100.0	52.0	10.8	37.2	332	173	36	123
1968-69	100.0	87.7	15.3	-3.0	229	201	35	7

Source: Tables D-1 and D-2.

cent interval, which is more consistent with data on per capita use of physician visits.^{12, Table 26}

The physicians' fee index, a component of the Consumer Price Index, shows an annual rate of increase of 2.5 per cent for the period 1929-1968. There was a small decline in the early 1930s, followed by a small increase in the later 1930s and by an annual increase of 3-3.5 per cent in the 1940s and 1950s. In the early 1960s the average rate of increase was slightly lower, but it has

accelerated in recent years. Since the annual fee index for recent years is calculated from monthly data both for calendar and fiscal years, the patterns shown are equally accurate. The highest rate of increase, 7.5 per cent, took place in the first year following Medicare. In subsequent years the rate of increase in fees has remained high, at 6 per cent.

Physicians' fee data are not to be taken at face value, however. Historically, it is known that customary fees,

which are the fees reported by the Consumer Price Index, have lagged behind average fees. In Anne Scitovsky's work in California, the difference in the rate of increase between customary and average fees is estimated within a range of 0.7-2.1 percentage points a year for the period of study, the 1950s and the first half of the 1960s.¹⁷ Employing more approximate methods, Martin Feldstein has estimated a nationwide difference of 0.9 percentage points a year.⁶ It is likely that this difference has narrowed or perhaps even disappeared.

Another factor, however, has come to attention in recent years: namely, the tendency by some physicians to fractionate office visits and to charge separately for laboratory services and inoculations.¹¹ This tendency exerts a similar effect, leading to an understatement by the Consumer Price Index of the rise in actual physician fees. The quantitative measure of this factor is not yet known, however.

These observations on the physician fee index have direct implications for the factor "all other." To understate the

Table P-3—Factors accounting for increase in expenditures: percentage distribution and dollar amounts for physicians' services, United States, selected years 1929-1969

Interval	Percentage distribution				Dollar amounts (millions)			
	Expenditures	Fee index	Population	All other	Expenditures	Fee index	Population	All other
Calendar years								
1929-68	100.0	39.1	20.3	40.6	\$10,557	\$4,128	\$2,143	\$4,286
1929-40	100.0	-66.7	266.7	-300.0	-32	-21	85	-96
1940-50	100.0	31.8	13.1	55.1	1,782	567	233	982
1950-60	100.0	46.6	23.3	30.1	2,929	1,365	682	882
1960-68	100.0	44.4	15.6	40.0	5,878	2,610	917	2,351
1929-35	100.0	-11.9	19.0	-107.1	-231	-27	44	-248
1935-40	100.0	4.3	17.0	78.7	199	9	34	156
1950-55	100.0	58.6	29.3	12.1	925	542	271	112
1955-60	100.0	37.5	19.3	43.2	2,004	751	387	866
1960-65	100.0	31.8	17.1	51.1	3,061	973	524	1,564
1966-68	100.0	52.5	9.2	38.3	2,046	1,074	188	784
1960-61	100.0	69.5	47.2	-16.7	211	147	99	-35
1961-62	100.0	29.3	16.2	54.5	603	177	98	328
1962-63	100.0	37.3	25.4	37.3	393	147	99	147
1963-64	100.0	15.3	8.5	76.2	1,174	180	100	894
1964-65	100.0	43.9	15.9	40.2	680	299	108	273
1965-66	100.0	120.8	25.0	-45.8	411	496	103	-188
1966-67	100.0	59.7	9.2	31.1	1,131	675	104	352
1967-68	100.0	46.7	8.3	45.0	1,275	595	106	574
Fiscal years								
1965-66	100.0	77.8	22.2	0.0	465	362	103	—
1966-67	100.0	77.3	12.4	10.3	873	675	108	90
1967-68	100.0	51.7	9.3	39.0	1,181	610	110	461
1968-69	100.0	67.8	11.1	21.1	997	676	111	210

Source: Tables P-1 and P-2.

Table H-3—Factors accounting for increase in expenditures: percentage distribution and dollar amounts for short-term hospital care, United States, selected years 1929-1969

Interval	Percentage distribution				Dollar amounts (millions)			
	Expenditures	Fee index	Population	All other	Expenditures	Fee index	Population	All other
Calendar years								
1929-68	100.0	60.8	13.4	25.8	\$15,038	\$9,143	\$2,015	\$3,880
1929-40	100.0	11.8	23.5	64.7	171	20	40	111
1940-50	100.0	59.3	9.7	31.0	1,683	998	163	522
1950-60	100.0	67.6	16.7	15.7	3,798	2,568	634	596
1960-68	100.0	74.6	11.5	13.9	9,386	7,002	1,079	1,305
1929-35	100.0	-21.4	57.1	64.3	34	-7	19	22
1935-40	100.0	22.4	13.8	63.8	137	31	19	87
1950-55	100.0	75.0	17.0	8.0	1,406	1,054	239	113
1955-60	100.0	61.2	16.5	22.3	2,392	1,464	395	533
1960-65	100.0	68.0	16.0	16.0	3,513	2,389	562	562
1966-68	100.0	94.2	6.4	-0.6	4,207	3,963	269	-25
1960-61	100.0	86.4	19.3	-5.7	541	468	104	-31
1961-62	100.0	80.5	18.4	1.1	581	468	107	6
1962-63	100.0	55.3	13.1	31.6	844	467	110	267
1963-64	100.0	54.4	15.2	30.4	761	414	116	231
1964-65	100.0	65.9	14.8	19.3	786	518	116	152
1965-66	100.0	57.5	7.2	35.3	1,666	958	120	588
1966-67	100.0	102.7	5.9	-8.6	2,076	2,132	122	-178
1967-68	100.0	84.6	6.4	9.0	2,131	1,803	136	192
Fiscal years								
1965-66	100.0	59.8	10.7	29.5	1,068	639	114	315
1966-67	100.0	81.8	5.9	12.3	2,141	1,751	126	264
1967-68	100.0	100.0	7.1	-7.1	1,909	1,909	136	-136
1968-69	100.0	77.2	5.8	17.0	2,530	1,953	147	430

Source: Tables H-1 and H-2.

rise in fees is to overstate the rise in output. Whenever "all other" is shown to be negative, as in 1960-1961 and 1965-1966, the decline in the volume of output must have been greater than shown, unless improvement in the quality of services served as an offset. If a decline in the quantity of output seems unlikely to have taken place, the original expenditures data must be questioned.

If the data are taken as shown over the long period, price rise accounted

for 39 per cent of the increase in expenditures. In recent years, price increases have accounted for between 50 and 75 per cent of the increase in expenditures. The contribution of price change is appreciably greater when allowance is made for the two sources of possible understatement in the physicians' fee index just mentioned.

The price index for physicians' services may be separated into two components, one reflecting the rise of prices in the economy as a whole and the other

being peculiar to physicians' services. If the Consumer Price Index (all items) is taken as the measure of general inflation, it accounts for three-fourths of the rise in physicians' fees for the entire period 1929-1968, and the extra rise was only one-fourth. There were times such as the 1940s when all consumer prices rose more than the physicians' fee index. In recent years the annual rate of increase in the physicians' fee index has exceeded that in the total Consumer Price Index by appreciable margins, ranging from 1 to 4 percentage points. If medical care prices were removed from the Consumer Price Index before making the comparison, the differential would be slightly larger.

The ratio of fee collections to charges represents, in effect, an adjustment to fees or to expenditures. Inability to collect 100 per cent of charges signifies an overstatement of fees at a given time or an understatement of the value of the work performed by physicians. When the basic data are converted into index numbers, however, the important consideration is not what the collections ratio is at this or that time, but rather the changes in this ratio that have occurred over time. On the basis of approximate figures, the improvement in the collections ratio from 82 per cent in 1929 to 92 per cent in 1966 is equivalent to an additional rise in fees of 0.3 per cent for the entire period 1929-1968; according to the method here employed this factor is deducted from "all other." The greatest effect of the improvement in collections was exerted in the 1950s, when the rate of increase averaged 0.7 per cent a year. This factor has not had much effect in the 1960s and inquiry has failed to elicit any data after 1966.

The aging factor attempts to account for the changing contribution of the population aged 65 and over in two ways. One, it considers the rising proportion of aged persons. Two, it also

takes into account the tendency for the per capita expenditures ratio, aged to young, to rise.^{12, Table 25} In the long run the aged factor has made a small contribution to the increase in expenditures for physicians' services, only 0.2 per cent a year, which is less than the contribution made by the improved collections ratio. However, the contribution of the aging factor in recent years is more substantial, although the exact number appears to vary with the interval of study—calendar year or fiscal year.

In summary, the analysis of the data for physicians' services serves to raise questions about the basic data on expenditures for one or more years and points to the desirability of making some adjustments in the physicians' fee index. Although price rise accounts for a substantial fraction of the increase in expenditures in recent years, it seems that per capita utilization has also increased. This finding runs counter to the available data on per capita use of physicians' visits and reinforces the conclusion that the physicians' fee component of the Consumer Price Index has understated the rise in their fees.

It is realized that this type of analysis does not explain why physicians' fees have increased at the rate that they have. For this, behavioral models, rather than accounting models, are required.

Expenditures for Hospital Services

The analysis of the rise in hospital expenditures is limited to nonfederal short-term hospitals. It became evident early in the study that there were no meaningful price data corresponding to an expenditures series for all hospital care in this country, including long-term.

Like Table P-1, Table H-1 shows expenditures and the per capita expenditures ratio of persons aged 65 and over to persons under age 65. In addition,

five alternative measures of price or unit cost are shown:

1. The Daily Service Charge component of the Consumer Price Index is the most frequently encountered index of hospital prices.⁹ It is seriously deficient, however, in that the Daily Service Charge has constituted a variable percentage of a hospital's revenues from patients,³ and does not reflect the prices for all hospital services.¹⁵

2. Expense per patient-day, as reported by the American Hospital Association, is also frequently encountered.²⁰ Over the long run, expense per patient-day will have increased less than the hospital's revenues from patients, owing to the declining relative importance of philanthropic income. The relationship of expense per patient-day to the Daily Service Charge is not predictable; in fact, the former has increased at a higher rate over the long run but at a lower rate in recent years. The defect of expense per patient-day as a measure of unit cost is that the numerator of the fraction—total expenses—pertains to the entire hospital operation, while the denominator—patient-days—pertains only to part of the hospital's output. If the number of inpatient days has increased at a lower rate than the output of ambulatory services, expense per patient-day will overstate the true increase in unit cost.

3. Expenditures per inpatient day are the quotient of the expenditures shown in this table divided by the number of patient-days. The expenditures are estimated by the Social Security Administration, based on the expenses reported by the American Hospital Association. However, upward adjustments have been made for timing and to incorporate osteopathic hospitals; and a modest deduction has been taken for research expenditures. It should be noted that, although expenditures have been adjusted to a calendar-year basis, patient-days have not. As a result, the level of unit

cost reported each year overstates the actual figure. This does not mean, however, that index numbers or percentage changes are necessarily biased upward.

4. Expenditures per adjusted patient-day (1 to 4) is the quotient of our expenditures divided by the number of adjusted patient-days, with an outpatient visit equated to one-fourth of an inpatient day.

5. Expenditures per adjusted patient-day (1 to 5) differ from the preceding item in that an outpatient visit is equated to one-fifth of an inpatient day. Expenditures per adjusted patient-day (1 to 4) and (1 to 5) represent an attempt to compensate for one of the deficiencies in the denominator discussed above. The ratios of 1 to 4 and 1 to 5 between an outpatient visit and a patient-day, though arbitrary, are plausible. In the August, 1969, *Hospitals Guide Issue* more precise weights are presented.² Since these weights are derived for revenues rather than cost, they are ultimately unsatisfactory. It is conceivable that empirical analysis will show that the weights have not been constant over time but have shifted.

Table H-2 shows the annual rates of changes for each factor for the intervals previously used. In this case "all other" is calculated to correspond to the hospital price index, Daily Service Charge. It would be possible to calculate "all other" to correspond to each of the other four measures of hospital unit cost. It is not necessary to perform these calculations, because the approximate figure for the annual rate of change in the appropriate "all other" can be read off Table H-2 by subtraction.

Table H-3 distributes the increase in expenditures for each interval among the Daily Service Charge, population, and "all other" factors.

For the period 1929-1968 expenditures for short-term hospital care increased at an annual rate of 10 per

cent. The rate of increase was low in the 1930s, accelerated in the 1940s to 15 per cent, but receded to 10 per cent in the 1950s and the early 1960s. Since 1965 the rate of increase has been much higher, with both the size and pattern of increase depending on the time interval—calendar year or fiscal year. For hospital expenditures the fiscal-year data probably have the same degree of validity as the calendar-year data.

The hospital Daily Service Charge component of the CPI rose by 5.9 per cent a year in the period 1929-1968. The rise was very small in the 1930s, 0.4 per cent, and slightly above the long-run average in the 1950s and early 1960s. It had been still higher, at 8.6 per cent, in the 1940s. However, the late 1960s show annual rates of increase double and even triple the long-run rate.

As previously stated, the column "all other" is the quotient of the index numbers of the expenditures data divided by the product of the index numbers of the price data and population data. From the calendar-year data it appears that a decline in output occurred in the intervals 1960-1961 and 1966-1967. On the other hand, the direct data on the use of services point to a continuing increase in per capita use.^{12, Table 28} It is, of course, conceivable that a deterioration took place in the quality of hospital care. In the absence of an overall indicator of quality, it was thought that a marked shift toward overcrowding might be indicative. The occupancy rate moved from 74.7 to 74.3 per cent in 1960-1961, and from 76.5 to 77.6 per cent in 1966-1967. It is believed, therefore, that the difficulty here lies with the Daily Service Charge as a measure of price change. It has been reported that, in the process of adapting their finances to the Medicare reimbursement formula, some hospitals raised the Daily Service Charge relative to the ancillary service charges in 1966.^{10, 15, 16}

Over the long run, the annual rate

of increase in expense per patient-day, AHA, has exceeded that of the Daily Service Charge, CPI, by one percentage point. The behavior of the two series interval by interval is by no means uniform, but for the most part their movements have been reasonably consistent with one another except in the late 1960s. It is believed that the lower rate of increase in expense per patient-day, AHA, is probably the more accurate reflection of developments in price or unit cost in recent years.

Expenditures per inpatient day are closely allied to expense per patient-day in the long run. In recent years considerable differences appear between them in either a positive or negative direction, depending in part on the interval studied.

It is perhaps astonishing that the series, expenditures per adjusted patient-day, has not shown any appreciable difference from the series' expenditures per inpatient day. It is clearly appropriate to continue to make the adjustment, but it appears doubtful on the basis of our findings that the task warrants a great deal of work. Notwithstanding, it may be that different results would be obtained from an adjusted patient-day series with shifting weights.

Data on the contribution of the aging factor toward the increase in expenditures for short-term hospital care are more fragmentary than the corresponding data for expenditures for physicians' services.^{12, Table 29} However, in the intervals for which data are available, it appears that the aging factor made virtually no contribution to the increase in short-term hospital expenditures in the past but has made an appreciable contribution, 2 to 4 per cent a year, in recent years.

When prices are measured by the Daily Service Charge, this factor accounted for 61 per cent of the increase in short-term hospital expenditures dur-

ing the period 1929-1968. In recent years, the relative contribution of the price increase has been far greater (94%). Indeed, for one or two years, and depending on the measure of unit cost, the entire increase in expenditures merely reflects an increase in price, so that there has been virtually no increase in output. These findings are, however, contradicted by the direct evidence on hospital services; these show a continuing upward trend in per capita use. A reconciliation would have to consider the possibility that a deterioration has taken place in the quality of care.

By contrast, the use of expenditures per adjusted patient-day of 1 to 5, in place of the Hospital Daily Service Charge as a measure of price change, substantially alters the contribution of prices and "all other."^{12, Tables 18-21} During the period 1929 to 1968, the contribution of prices is greater—71 per cent compared with 61 per cent above. In the short run, although the relative contribution of price is still high, it is reduced from 94 per cent, as above, to 78 per cent.^{12, Table 21} The reduction in the contribution of the price factor is of course accompanied by an offsetting increase in the "all other" component. For example, the use of the Hospital Daily Service Charge resulted in a negative rate (-0.6%) in "all other" in the two-year period 1966-1968. When the expenses per patient-day are used as a measure of price change, an increase of 16 per cent in the "all other" is noted for the two-year period, which is more consistent with the data on per capita use.

Notwithstanding, no amount of research is likely to alter the fact that recent years have witnessed persistent and sizable increases in hospital unit cost. It is not unreasonable to suppose that this development, which is associated in time with the coming of Medicare, is also attributable to some aspect of the

Medicare program. Some students of hospital cost would argue that today, for the first time, hospitals are in a position to keep up with wages and salaries paid in other industries.^{7,18} The counterargument—to the position that the major factor at work is the influx of additional funds with its concomitant effect on wages and salaries—is that nonpayroll expenses have increased at a higher rate than payroll, so that the proportion of payroll to total hospital expenses declined from 61.7 per cent in 1965 to 59.6 per cent in 1968. It may be that the Medicare (and Medicaid) formula that reimburses each hospital in relation to its own cost, when superimposed on cost reimbursement by Blue Cross plans, has created disincentives to efficient management.¹⁹

Dental Services, Physicians' Services, and Short-Term Hospital Care Combined

For the three expenditures categories combined, price (as measured by the appropriate CPI component) has contributed one-half of the increase in expenditures over the long period, 1929-1968. Although the role of prices has been larger in recent years—at 75 per cent and even more—it has fluctuated appreciably from period to period, or year to year, even in the 1960s.

With utilization accounting for one-half of the long-term increase in expenditures, this factor is in turn subdivided between population change and per capita use (including quality) in the ratio of one-third and two-thirds. In recent years, population has accounted for 8 per cent of the increase in expenditures, while "all other" has contributed about 15 per cent.

As previously noted, a better measure of change in hospital cost is the change in cost of an adjusted patient-day, say at the ratio of one-fifth between an outpatient visit and a patient-day. When

this measure is adopted and incorporated in calculations for the sum of the three expenditures categories, the contribution of price is increased in the long term, but reduced in the short term.

The following tabulation compares the relative contributions of price, population, and "all other" in the long term and in the short term, respectively, under three headings: the sum of three expenditures categories, with CPI as the measure of all prices; the sum of three expenditures categories, with the cost of an adjusted patient-day as the measure of hospital price; and total personal health care expenditures, with the CPI medical care component used as the measure of price change.

greater contribution to the rise in expenditures for the three categories combined than it does for total personal health care expenditures, and "all other" makes a correspondingly smaller contribution.

Summary and Conclusions

An accounting framework has been presented for analyzing the increase in expenditures for dental services, short-term hospitals, and physicians' services over a period of almost 40 years. The very process of analysis serves to raise questions concerning some of the basic data themselves.

The findings indicate that, in the late 1960s, both expenditures and prices have

Factor	Percentage distribution		
	Sum of three expenditures categories		
	CPI as measure of prices	Cost of adjusted patient-day as measure of hospital price	Total expenditures, with CPI medical care as measure of price
Long term (1929-1968)			
Total	100.0	100.0	100.0
Price	51.0	56.6	38.0
Population	17.2	17.1	18.3
"All other"	31.8	26.3	43.7
Short term (1966-1968)			
Total	100.0	100.0	100.0
Price	77.9	68.0	50.8
Population	7.6	7.7	8.4
"All other"	14.5	24.3	40.8

In light of the earlier discussions of the several alternative measures of price (or unit cost), it is believed that the second column presents a more valid per cent distribution than does the first column. In any case, whatever the measure of price, this factor makes a far

increased faster than they did in the early 1960s and over the entire period 1929-1968. In dental services it appears that an appreciable increase in output has taken place. In the case of physician services the computed findings, prior to any adjustment of the fee index, contra-

dict the direct data on per capita services used and point to continuing gains, though at a more modest level than in the past. In the case of hospital services the increase in output is small, the exact amount depending on the measure of price or unit cost employed and on the time interval—calendar year or fiscal year.

Other factors introduced into the analysis show that the improved collection experience of physicians accounts for a modest fraction of the increase in expenditures in the long run, and has played no role in the 1960s. The contribution of the aging factor to the rise in expenditures for physicians' services is even smaller in the long run than that made by the improved collection ratio, but has been appreciable in recent years. In the case of hospital care, the aging factor has assumed considerable importance in recent years. It appears to have been of small consequence in the past, at least for the years for which data are available.

The type of analysis presented in this paper is not in itself sufficient for arriving at behavioral explanations. It is believed, however, to be an essential prerequisite for formulating the dimensions of the problem of the rise in health services expenditures, and for describing the patterns that require explanation. Data drawn from other sources and other types of analysis can then be usefully brought to bear on alternative explanatory theories.

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Smoke Gets in Your Ears

There is a chance that cigarette smokers over 50 may also be slightly hard of hearing. A study of 97 male executives by an investigator from the Women's Medical College of Pennsylvania indicates that smoking can cause a mildly impaired ability to hear low-pitched sounds. According to the study, "cigarette smoking causes a conductive hearing loss, probably due to involvement of the eustachian tube in some individuals." (*Health Insurance News*, March 10, 1970; 277 Park Ave., New York, N. Y. 10017.)

Special Education Information Center

The Bureau of Education for the Handicapped has started a new service in behalf of children needing special education: The National Special Education Center. During the past several months, a nation-wide survey has been conducted to determine the name, address, and nature of the services of every educational project in the United States offering programs for handicapped children. This information is being recorded in a computer and will be made available without charge to parents, guardians, teachers, and other interested persons. The survey will be continuous and, as new information about facilities is received it will be promptly fed into the computer. Requests for the computerized information should be addressed to "Closer Look," Box 1492, Washington, D. C. 20013.