Comparative trends in hospital expenses, finances, utilization, and inputs, 1970-81

by Jerry Cromwell, Helene T. Hewes, Nancy L. Kelly, and Saul Franklin

The annual surveys of the American Hospital Association historically have been the only national source of statistics on hospital structure and performance. Although valuable, this source has not provided the policy or research community with hospital-specific information on revenues, assets, and financial status. Data on these and other variables from heretofore unpublished Medicare cost report data are presented in this article. Hospital expenses, revenues, profits, indebtedness, utilization, investments, and employees are trended over the 1970-81 period by urban-rural location, teaching status, and ownership. It is indicated in these data that a major transformation in the hospital industry has occurred in response to cost-based Medicare-Medicaid and other factors that made acute care essentially unaffordable to the average citizen. The health maintenance organization movement and Medicare's prospective payment system are seen as logical reactions to this transformation.

Introduction

For 15 years after the introduction of Medicare and Medicaid in 1966, health costs were rising at an annual rate of more than 12 percent. Expenditures for the hospital sector alone were climbing at approximately the same rate. Health spending, which claimed 6.2 percent of the gross national product in 1965, took up 8.9 percent of the national product in 1980. Both private and public health spending reflected this growth, with Medicare and Medicaid costs rising from $1 billion to $2 billion initially to nearly $50 billion in 1981 (Freeland and Schendler, 1981) while private spending quadrupled over the same period.

Over the 10-year period of the 1970's, total Medicare enrollees grew by more than 7 million, a 3.4 percent annual compound growth (Muse and Sawyer, 1982). Payments, however, grew almost five times faster, or 15.8 percent. Thus, program enrollment growth explained only about one-fifth of Medicare program cost inflation.

Focusing more directly on hospital care, total Medicare discharges grew 5.6 percent annually between 1970 and 1978, or 2.1 percent on a per enrollee basis (Muse and Sawyer, 1982). Total days of care grew much more slowly, however, producing a slight decline in days per enrollee, -0.4 percent annually. Length of stay fell 2.1 percent annually, or 2 days in 8 years. Hospital payments per enrollee grew 11.6 percent annually over the decade, two points higher than on a per discharge basis (9.5 percent).

The 1980's ushered in a new era of slower growth, attributable in significant part to Medicare's innovative prospective payment system (PPS), which limits the rate of increase in payments to hospitals. Medicare hospital outlays rose by only 5.5 percent in fiscal year 1985, the smallest rate of increase in the history of the program (U.S. Department of Health and Human Services, 1986). Medicare days of care, which fell by less than one-half a percentage point a year in the 1970's, fell 10.5 percent in the first year of the PPS and 13.0 percent in the second year (U.S. Department of Health and Human Services, 1986). Such remarkable reversals in historical trends demand explanation. In particular, how much of the decline in the utilization of and cost inflation in hospitals can be explained by the switch from retrospective to prospective payment for Medicare?

In answering this question, it is valuable to look back and describe in some detail the experience of the previous decade. Existing literature and data on many aspects of hospital performance are surprisingly limited—surprising given the plethora of data available from annual surveys of the American Hospital Association (AHA). What is missing is hospital-specific information on revenues, financial status, Medicare costs and utilization, and assets and investment that would permit comparative trends in utilization, expenses, finances, and inputs by urban-rural location, bed size, teaching status, and ownership. This article contains such information based on heretofore unpublished Medicare cost report data, showing where the hospital industry was in 1970 near the beginning of Medicare and Medicaid and how it evolved over the decade. The data were collected as part of a 6-year longitudinal study of prospective rate setting in 15 States funded by the Health Care Financing Administration (HCFA). Important decadal trends are highlighted in this article. A more extensive set of tables and discussion are available in Cromwell, et al. (1986).

The rest of the article is in six sections. First, the data sources, sampling methods, and mode of presentation are discussed. This is followed by a set of

This article was prepared as part of the National Hospital Rate-Setting Study under HCFA Contract No. 500-78-0036. Any opinions expressed are solely those of the authors and should not be ascribed to the Health Care Financing Administration.

Reprint requests: Jerry Cromwell, Ph.D., President, Center for Health Economics Research, Inc., 75 Second Avenue, Needham, Massachusetts 02194.

descriptive results grouped into the following four areas:

- Revenues, expenses, and financial status.
- Utilization (including admissions and lengths of stay).
- Assets, investment rates, and age of capital stocks.
- Employees and salaries.

In the concluding section, a few comparisons of the 1970's experience with that of the post-PPS world are made.

Data sources and methods

Sample frame

The sample frame for this descriptive analysis of the 1970's relied on the hospital year as the unit of observation, based on a list of all short-term general hospitals that responded to the AHA annual survey in any year between 1969 and 1976, inclusively. A one-quarter random sample of all U.S. short-term general hospitals was drawn, resulting in a full sample of between 1,300 and 1,400 hospitals per year, with observations covering all or part of the 1969-81 period. The year 1969 was excluded from the analysis as the Medicare cost reports did not extend back to that year. For some variables (e.g., hospital revenues, financial status, and investment), Medicare cost report data for the early 1980's were unavailable, limiting analysis of these variables to the 1970-79 period.

Data bases

The hospital file was constructed from two sources: *AHA Hospital Annual Survey Statistics* and the *HCFA Medicare Cost Reports*.

AHA Survey Statistics tapes provided information on bedsize, ownership, teaching status, and facilities and services. These data are well known and require no additional elaboration. This leaves the Medicare cost reports, a source much less familiar to the average researcher.

The Medicare cost report (MCR) is completed annually by all Medicare-participating hospitals for purposes of Medicare reimbursement. These detailed statistical and financial reports are audited by Medicare's fiscal intermediaries to assure that the amounts paid to each hospital compensate for services provided to patients covered by the Title V, XVIII, and XIX programs. Reports were collected for approximately 2,500 hospitals annually from 1970 to 1981 as part of the HCFA-funded National Hospital Rate Setting Study, approximately one-half coming from the one-quarter random national sample described above and the other one-half coming from a supplement in 15 rate-setting States. Only data on the one-quarter sample are presented in this article.

From its inception in 1966, the cost report has evolved from a rather simple report of about 10 pages to a much more complicated document of over 40 pages. Needless to say, many problems had to be overcome in acquiring and cleaning such a data series. Flexible coding procedures were required to allow for several levels of aggregation of assets, fund balances, inpatient and outpatient costs, etc. Once the data were computerized, extensive editing, cleaning, and replacement algorithms were undertaken to address such problems as inaccurately reported revenue, utilization, asset, and balance sheet totals, coding and key punching errors, inconsistent aggregation and accounting methods, and completely missing MCR's for a particular hospital.

The abstracting and editing process involved three steps. First, direct supervision by a technically skilled person with a master's degree in business administration was used to assist coders in abstracting the data on the spot. Second, extensive computerized accounting and temporal edits were made to insure that items added up and that they did not jump up and down in meaningless patterns. Third, a visual inspection and hand correction of the remaining outliers for difficult-to-clean data series such as capital investment was undertaken.

To test the quality of data from the Medicare Cost Reports (MCR's), a further comparison was made with data from the AHA's annual survey of hospitals. Comparisons were limited to those variables defined the same way in each of the two sources: total expenses per hospital, total admissions, total discharges, total inpatient days, mean length of stay, average cost per admission, and average cost per inpatient day. Comparisons based on region, urban or rural location, teaching status, ownership, and bed size were made using 1981 unweighted data from the two sources.[1]

In general, there were no significant differences between the 1981 AHA and MCR values for total expenses, total admissions, total discharges, and average cost per admission. For example, according to the MCR data, hospitals reported, on the average, $17.2 million in total 1981 expenses compared with $17.4 million according to AHA data. The two data sources were also quite similar in costs per admission. When these variables were compared by hospital characteristics, somewhat larger discrepancies occurred, depending on the specific variable and stratifier used. However, the overall consistency of these four variables across data sources suggests that they are reliable estimates.

Comparing MCR and AHA data for total inpatient days revealed greater differences by hospital characteristic. The AHA length-of-stay value of 6.98 days exceeded the MCR value of 6.56 days by 6 percent. Conversely, the MCR value for costs per inpatient day was 6 percent more than the 1981 AHA value. More caution should be applied, therefore, to any per diem comparisons.

Weighting for nonresponse

A complicated, variable-specific weighting scheme was designed to adjust for nonresponse. Data for each

[1] A detailed discussion (including tables) is presented in Cromwell, et al., 1986, Appendix B, volume II.

variable (over 60 variables in all) were disaggregated into 1,440 cells as follows:

- 12 years—1970-81.
- Four regions—Northeast, North Central, South, and West.
- Three ownership categories—State and local government, proprietary, and private voluntary.
- Five bed-size categories—less than 50 beds, 50-99, 100-199, 200-399, and 400 beds or more.
- Teaching status—nonteaching hospitals versus hospitals with any type of medical school affiliation.

Weights were calculated based on the inverse of the ratio of reporting hospitals to the total number of hospitals present in each cell. For any given cell, the weight for each reporting hospital is the same. Data in those cells with high nonresponse rates, therefore, were weighted more heavily.

This weighting method adjusts for nonresponse within bed-size category, but not for bed-size differences in the data themselves. No further weighting is made by hospital bed size, number of admissions, days, or discharges. Each hospital's statistics are treated equally (i.e., unweighted) given the focus is on the hospital as the unit of analysis rather than on the patient.

Adjusting for outpatient activity

When hospital statistics are presented on a per admission or per inpatient day basis, they have been adjusted for outpatient activity. Generally, expenses, revenues, and other cost report data apply both to inpatient and outpatient services, requiring an adjustment in the inpatient utilization statistic for interhospital comparability. The AHA applies a ratio of inpatient to outpatient revenues in making an adjustment for outpatient (OPD) activity, but it treats skilled nursing facility (SNF) days as inpatient equivalents. Ideally, SNF and outpatient activity should be weighted by their unique contribution to marginal costs. To determine such weights, a dynamic cost function was estimated in a first stage, producing marginal costs for SNF and OPD activity. These estimates were then inserted into a second-stage output equation, giving the following adjusted admissions (ADJADMS) and inpatient days (ADJDAYS) expressions:

$$\begin{aligned} \text{ADJADMS} &= \text{ADM}(1+\text{SNFID}/\text{ADM})^{0.06303} \\ &\quad (1+\text{OPV}/\text{ADM})^{0.0298} \quad (1) \\ \text{ADJDAYS} &= \text{IPD}(1+\text{SNFID}/\text{ADM})^{0.06303} \\ &\quad (1+\text{OPV}/\text{ADM})^{0.0298}, \end{aligned}$$

Where ADM = raw inpatient admissions, SNFID = hospital-based SNF days, OPV = outpatient clinic visits, and IPD = raw inpatient days. Where SNFID and/or OPV are zero, reported and adjusted figures are assumed identical.

The AHA assumes that four outpatient visits are equivalent to one inpatient day. This is a far higher equivalency than for weights derived from a marginal cost regression, where eight outpatient visits are estimated to be equal to one inpatient day. Using the 4 to 1 relative charges as weights, the AHA measures of unadjusted versus adjusted output imply that outpatient visits alone raise the level of national hospital total output by 13.5 percent. Using weights derived from a short-run cost function, with output adjusted for both outpatient visits and SNF inpatient days, outpatient visits raise output only 6 percent. And although AHA average revenue versus marginal cost-weighted output levels are correlated .98, year-to-year changes in output are correlated only .56, attributable primarily to the much lower weight given to volatile outpatient activity using short-run cost weights.

The effect of adjusting for both SNF and outpatient clinic activity is to lower the per admission and per day cost statistics by raising the denominator wherever SNF or OPD activity is positive. Hospitals showing rapid SNF or OPD visit growth will also exhibit slower cost inflation on an adjusted output basis although not as slow as when the AHA's 4 to 1 inpatient day-outpatient visit ratio is used. A detailed discussion of the derivation of the SNF and OPD adjustment methodology can be found in Appendix A in Coelen, et al. (1985).

Method of tabular presentation

All variables are presented in similar fashion employing the following three-way tables:

- Urban or rural location by year.
- Teaching status by year.
- Ownership by year.

Teaching status is defined by AHA-reported affiliation with a medical school. Ownership is defined as non-Federal private voluntary, public (State, city, and county), or proprietary.

Sample sizes and statistical reliability

There were a total of 1,388 U.S. short-term non-Federal hospitals in the sample in 1970, with 712 hospitals located in urban areas and 676 in rural areas. The total number of sampled hospitals peaked at 1,413 in 1974, falling to 1,329 by 1981. In many instances, however, not all of these hospitals reported a particular item, so the actual number reporting is usually smaller. As a standard practice, where 75 percent (or more) nonreporting exists for a specific cell, an asterisk is shown instead of an estimated value. Where hospitals did not report Medicare admissions, they were excluded from the sample only for the relevant variables.

Because the statistics presented in this article are based on a one-quarter random sample, their reliability must be considered. T-tests of mean differences involving two independent samples from

normal populations[2] can be calculated using the following formula:

$$Z = (2)\frac{\bar{x}_1 - \bar{x}_2}{\sigma^2_1/n_1 + \sigma^2_2/n_2} \quad (2)$$

where the Z statistic's confidence level can be determined from the usual t table, and $\bar{x}_1$, $\bar{x}_2$ = means of the two sample cells, σ^2_1, σ^2_2 = variances of the two samples, and n_1, n_2 = number of reporting hospitals in the cells. Both the means and standard deviations have been weighted for nonresponse.

To provide the reader with a general feeling for the statistical significance of observed differences, a few Z statistics are calculated from Table 1 for total hospital expenses per adjusted admission.[3] For 1981, the mean urban and rural figures were $2,443 and $1,490, respectively, with standard deviations of $1,233 and $618. The Z statistic is 14.4, which is significant at the 99-percent confidence level. Other Z statistics for 1981 include teaching versus nonteaching, $t = 9.8$; private voluntary versus proprietary, $t = 0.2$; and the change from 1980 to 1981, $t = 3.0$.

As a general rule, the more aggregate comparisons (e.g., all urban versus all rural) will more often prove statistically significant. Furthermore, significance levels will vary by variable, depending on the underlying degree of natural variation.

Trends in hospital finances

Expenses

The rapid growth in Medicare hospital outlays can be explained almost entirely by the industry's burgeoning cost structure. Total hospital expenses per adjusted admission grew 12 percent annually from 1970 through 1981 (Table 1). On a per diem basis, the rate was 1 1/2 percentage points higher (13.5 percent) because of the falling average length of stay. Ancillary expenses grew considerably faster than routine (16.8 versus 12.3 percent, respectively), so that by 1979 the two accounted for nearly equal shares of hospitals' costs: 47 percent ancillaries; 53 percent routine.

Rapid cost inflation in the 1970's permeated the industry, as evidenced by the similar growth rates across hospital characteristics in expenses per adjusted admission or day. Interestingly, proprietary hospitals exhibited the fastest growth per adjusted admission (13.3 percent), over two points higher than for teaching hospitals. Of course, the latter were twice as expensive at the beginning of the decade. Both teaching and nonteaching hospitals' costs grew more slowly than the national average, the difference was attributable to a rising proportion of expensive teaching hospitals in the sample as nonteaching hospitals closed or merged with teaching institutions.

Although one might have expected Medicare Part A expenses (payments) per admission to rise faster than total costs, such was not the case. According to data in Table 2, between 1970 and 1979, Part A expenses per admission grew 10.5 percent annually, a rate 1 1/2 percentage points below the average rate of cost inflation. Nonetheless, even with the slower payment growth per Medicare admission, the industry became increasingly dependent on Medicare reimbursement. By 1979, one of every three of the average hospital's dollars came from the program, up slightly from 30.7 percent in 1970. This is explained by the relatively rapid growth in Medicare admissions, as shown later.

Rural hospitals have always been more dependent on Medicare, although the urban-rural gap narrowed somewhat in the 1970's. At the same time, teaching hospitals, which operate mainly in urban areas, also became much more dependent on Medicare. Over the decade, Medicare's share of expenses in teaching hospitals rose from 22 to 30 percent, a rate far in excess of that in nonteaching hospitals. Finally, even though Medicare patients are often considered unprofitable, proprietary hospitals depended on the program as much as public or private voluntary institutions did throughout the decade, in some cases, even more so.

Revenues

Lines 1 through 8 of Table 3 provide corresponding trends in net patient service revenues per adjusted admission. Net revenues are monies left after bad debts and contractual disallowances are subtracted from gross revenues, and patient-service revenues are charges only for patient care (excluding nonoperating income such as investments, for example). Net patient revenues were not only consistently less than total hospital expenses, they also grew more slowly, 11.4 versus 12.0 percent annually between 1970 and 1979, respectively, on a per admission basis.

Expenses outstripping revenues implies declining financial ratios, as evidenced by the operating and total margin trends in Table 3. Hospital operating margins, defined as net operating income over total patient income, were negative throughout the decade, ranging from a high of −0.50 percent in 1970 to a low of −3.41 percent in 1974. Finances then improved through 1979, but operating margins still averaged −1.79 percent. Only proprietary hospitals showed positive operating margins during the 1970's, with rural, teaching, and public hospitals losing the most.

Because it is standard operating practice among some hospitals (e.g., city and county) to subsidize operating costs with other revenues, total hospital margins are considered a more meaningful indicator of financial well-being. When all revenues are considered, including those from endowments, public treasuries, and other sources (e.g., real estate), total margins are uniformly positive, ranging from a high of 3.33 percent nationally in 1970 to a low of 1.36 in 1974. Total margin trends thus exhibited a U-shape in

[2]Many of the distributions are not strictly normal, so that any statistical inferences ought to be made with caution.

[3]The variances and cell sizes necessary to calculate individual significance tests can be found in Cromwell et al. (1986).

Table 1

Total hospital expenses per adjusted admission and per adjusted day, and ancillary services as a percent of total expenses, by area, teaching status, and type of hospital: 1970-81

Area, teaching status, and type of hospital	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	Annual compound growth rate
						Expenses per adjusted admission							
Total	$529	$575	$636	$690	$781	$907	$1,025	$1,166	$1,319	$1,483	$1,742	$1,985	12.0
Urban	644	695	781	848	966	1,116	1,267	1,442	1,619	1,821	2,077	2,443	12.1
Rural	399	443	480	520	580	676	768	869	991	1,118	1,348	1,490	12.0
Nonteaching	500	537	592	625	707	825	936	1,065	1,208	1,357	1,602	1,816	11.7
Teaching	931	1,043	1,175	1,287	1,433	1,626	1,779	1,913	2,106	2,383	2,736	3,158	11.1
Private voluntary	586	622	694	742	837	977	1,110	1,262	1,420	1,587	1,824	2,122	11.7
Proprietary	479	548	589	656	773	898	990	1,141	1,341	1,534	1,852	2,076	13.3
State and local government	428	491	539	604	675	772	871	981	1,105	1,252	1,528	1,668	12.4
						Expenses per adjusted day							
Total	$69	$79	$89	$99	$114	$134	$153	$175	$199	$226	$260	$303	13.5
Urban	80	91	104	115	132	155	176	199	225	254	290	336	13.0
Rural	57	66	73	82	93	112	129	149	172	196	226	266	14.0
Nonteaching	67	76	86	94	107	127	145	168	192	217	250	290	13.3
Teaching	101	115	133	147	170	196	215	227	255	290	335	388	12.2
Private voluntary	73	82	92	101	116	136	156	178	202	228	262	308	13.1
Proprietary	73	84	94	106	124	145	162	191	222	250	289	324	13.5
State and local government	60	71	80	91	105	125	142	161	183	210	243	282	14.1
						Ancillary services as percent of total expenses							
Total	38.7	39.2	40.3	41.8	43.2	44.2	45.0	46.1	46.7	47.0	NA	NA	2.2
Urban	40.3	41.0	41.9	43.1	44.6	45.6	46.0	46.9	47.6	47.9	NA	NA	1.9
Rural	37.1	37.4	38.5	40.4	41.8	42.8	43.9	45.2	45.7	46.0	NA	NA	2.4
Nonteaching	38.5	38.8	39.9	41.4	42.8	43.9	44.7	45.8	46.4	46.7	NA	NA	2.1
Teaching	42.7	44.1	44.8	45.1	46.9	47.7	47.5	48.5	48.9	49.4	NA	NA	1.6
Private voluntary	38.8	39.7	40.6	42.1	43.5	44.4	45.3	46.4	47.0	47.4	NA	NA	2.2
Proprietary	40.8	40.0	41.5	43.1	44.5	46.4	46.7	47.7	48.7	48.7	NA	NA	2.0
State and local government	37.5	37.8	38.8	40.5	42.0	42.9	43.5	44.7	45.2	45.5	NA	NA	2.1

NOTES: Data are based on hospital averages not weighted by admissions, days, or bed size. NA is data not available.

SOURCES: Abt Associates, Inc.: *National Hospital Rate-Setting Study*. Contract No. 500-78-0036. Prepared for the Health Care Financing Administration. Cambridge, Mass.; Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the Medicare cost reports for a 25-percent sample of U.S. short-term non-Federal hospitals.

Table 2

Medicare Part A expenses per Medicare admission and as a percent of total expenses, by area, teaching status, and type of hospital: 1970-79

Area, teaching status, and type of hospital	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	Annual compound growth rate
	Part A expenses per Medicare admission										
Total	$636	$713	$767	$835	$928	$1,065	$1,182	$1,301	$1,450	$1,634	10.5
Urban	800	903	974	1,067	1,194	1,378	1,529	1,680	1,878	2,124	10.8
Rural	475	523	558	591	647	731	820	906	1,013	1,131	9.6
Nonteaching	601	671	721	761	850	976	1,081	1,181	1,310	1,476	10.0
Teaching	1,105	1,248	1,323	1,501	1,611	1,835	2,022	2,182	2,459	2,775	10.2
Private voluntary	702	784	846	904	1,004	1,163	1,311	1,448	1,609	1,806	10.5
Proprietary	598	698	778	875	1,035	1,172	1,253	1,390	1,560	1,798	12.2
State and local government	513	570	598	673	721	815	889	964	1,080	1,214	9.6
	Part A expenses as percent of total										
Total	30.7	30.5	30.1	30.1	31.2	31.4	32.2	32.5	33.4	34.0	1.1
Urban	27.5	27.2	27.2	27.2	28.7	29.2	30.1	30.8	32.1	32.7	1.9
Rural	33.8	34.0	33.1	33.1	33.8	33.8	34.3	34.2	34.8	35.4	0.5
Nonteaching	31.3	31.3	30.8	30.9	32.0	32.0	32.8	33.1	34.0	34.5	1.1
Teaching	22.0	20.7	20.9	22.5	24.3	25.6	26.8	27.8	29.0	29.9	3.4
Private voluntary	28.9	28.7	28.7	28.8	30.1	30.7	31.5	31.8	32.7	33.4	1.6
Proprietary	31.9	32.8	31.5	31.5	33.0	32.7	32.9	33.3	35.3	34.7	0.9
State and local government	33.9	33.3	32.4	31.9	32.5	32.1	33.3	33.6	33.9	34.8	0.3

NOTE: Data are based on hospital averages not weighted by admissions, days, or bed size.

SOURCES: Abt Associates, Inc.: *National Hospital Rate-Setting Study*. Contract No. 500-78-0036. Prepared for the Health Care Financing Administration. Cambridge, Mass.; Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the Medicare cost reports for a 25-percent sample of U.S. short-term non-Federal hospitals.

the 1970's, falling to a low in 1974, then rising fairly steadily through 1979. Operating margins showed a nearly identical U-shape. Margins on nonoperating revenues clearly remained in a narrow range of 4 percent, plus or minus .5 percent, reflecting the preference of many hospitals to subsidize patient care through nonoperating income.

The margins shown in Table 3 show less positive or negative spread over time than those provided by the AHA (as found in the *Federal Register*, 1986). This is because the wider range of profitability in smaller hospitals is unweighted in our results versus the weighted ratios presented by the AHA. Nevertheless, the trend of growing profits observed in the 1980's goes back at least to the mid-1970's in both data sets, with some indication from the Medicare cost report data that profit rates were falling prior to 1975.

Figures 1 and 2 provide a frequency distribution of hospital total and operating margins at the beginning and end of the last decade. The normality of the operating margin distribution is striking in both periods, although a definite shift to negative margins occurred over time. In 1970, one in four hospitals had operating margins above 4.5 percent. In 1979, just one in seven were as successful. Most of this shift is reflected in a large reduction in hospitals enjoying 6 percent margins (plus or minus 1.5 percent) and a major increase in large "losers," i.e., those with losses greater than 15 percent.

Relative to operating margins, total margins exhibited a pronounced left skew, with the vast majority of hospitals in the black. Even with deteriorating operating margins at the end of the decade, 1 of every 6 hospitals had total margins of 7.5 percent or more and 1 of every 12 had margins above 10 percent. Conversely, only 1 of every 5 hospitals had negative total margins, a frequency little changed over 10 years. Ignoring the large group of "break-even" hospitals with margins plus or minus 1.5 percent, nearly 1 of every 2 hospitals had negative operating margins as late as 1979 and only 1 of every 5 were still negative on a total margin basis.

Trends for two additional financial variables—the current ratio and long-term debtedness—are shown in Table 4. Calculated as the ratio of short-term (current) assets to current liabilities, the current ratio is a standard short-run liquidity indicator that provides "the first clue that something more basic is wrong" (Cleverley, 1978) with the firm's financial status. A ratio of 2.0 is common in other industries. Hospitals continually enjoyed rates far above this threshold, but the ratio fell from 3.67 in 1970 to 2.76 in 1979. Rural and public hospitals exhibited especially high current ratios but became more like urban and private hospitals over time.

Finally, lines 9 through 16 in Table 4 show the growing indebtedness of the industry. In 1970, only 13.5 percent of net total assets were funded through long-term debt. By 1979, the percentage had almost doubled to over 25 percent. Thus, although revenues more or less managed to cover the rapid growth in expenses over the decade, internal capital sources (e.g., donations, Government grants) apparently were insufficient to meet perceived capital formation needs.

Indebtedness rates varied systematically by urban-rural location and ownership. Urban hospitals incurred long-term debt as a percent of net assets at a historically higher rate than rural hospitals did,

Table 3

Hospital net patient service revenues, operating margins, and total margins, by area, teaching status, and type of hospital: 1970-79

Area, teaching status, and type of hospital	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	Annual compound growth rate
						Net patient service revenues per admission					
Total	$491	$560	$593	$638	$713	$839	$950	$1,077	$1,237	$1,369	11.4
Urban	596	690	731	790	883	1,047	1,183	1,333	1,535	1,690	11.6
Rural	383	425	452	480	533	622	711	811	920	1,034	11.0
Nonteaching	469	532	560	594	662	778	880	993	1,138	1,267	11.0
Teaching	781	905	999	1,051	1,181	1,395	1,594	1,728	1,970	2,123	11.1
Private voluntary	532	617	648	701	785	915	1,047	1,185	1,354	1,499	11.5
Proprietary	500	550	599	648	733	869	980	1,099	1,324	1,487	12.1
State and local government	397	443	474	507	559	669	735	844	960	1,055	10.9
						Operating margin					
Total	-0.50	-0.67	-1.80	-3.14	-3.41	-2.28	-1.62	-1.43	-2.44	-1.79	—
Urban	0.23	0.63	-0.85	-2.32	-2.34	-1.28	*	-0.83	-1.09	-0.64	—
Rural	-1.21	-1.95	-2.73	-3.98	-4.50	-3.28	-2.94	-2.03	-3.78	-2.94	—
Nonteaching	-0.21	-0.44	-1.60	-2.87	-3.29	-1.96	-1.33	-1.06	-2.28	-1.66	—
Teaching	-4.65	-3.70	-4.40	-5.81	-4.53	-5.32	*	-4.28	-3.62	-2.84	—
Private voluntary	-0.46	-0.40	-1.48	-2.41	-2.28	-2.06	-0.99	-0.89	-1.64	-1.12	—
Proprietary	4.01	3.86	3.48	0.18	-0.84	1.72	*	*	2.10	3.28	—
State and local government	-3.00	-3.62	-5.25	-6.33	-7.02	-4.72	*	*	-6.12	-5.47	—
						Total margin					
Total	3.33	2.92	2.12	1.43	1.36	1.75	2.44	2.30	2.09	2.54	—
Urban	3.69	3.43	2.45	1.72	1.72	2.18	2.93	2.62	2.59	2.78	—
Rural	2.98	2.41	1.79	1.13	0.99	1.32	1.94	1.98	1.59	2.30	—
Nonteaching	3.45	2.98	2.13	1.43	1.34	1.82	2.45	2.20	2.06	2.58	—
Teaching	1.61	2.12	1.89	1.46	1.57	1.06	*	3.03	2.36	2.29	—
Private voluntary	3.47	3.09	2.44	1.79	1.81	1.89	2.69	2.57	2.30	2.72	—
Proprietary	5.38	5.28	3.51	1.86	1.58	3.04	*	*	3.41	4.56	—
State and local government	1.93	1.31	0.73	0.48	0.34	0.82	0.64	*	1.08	1.27	—

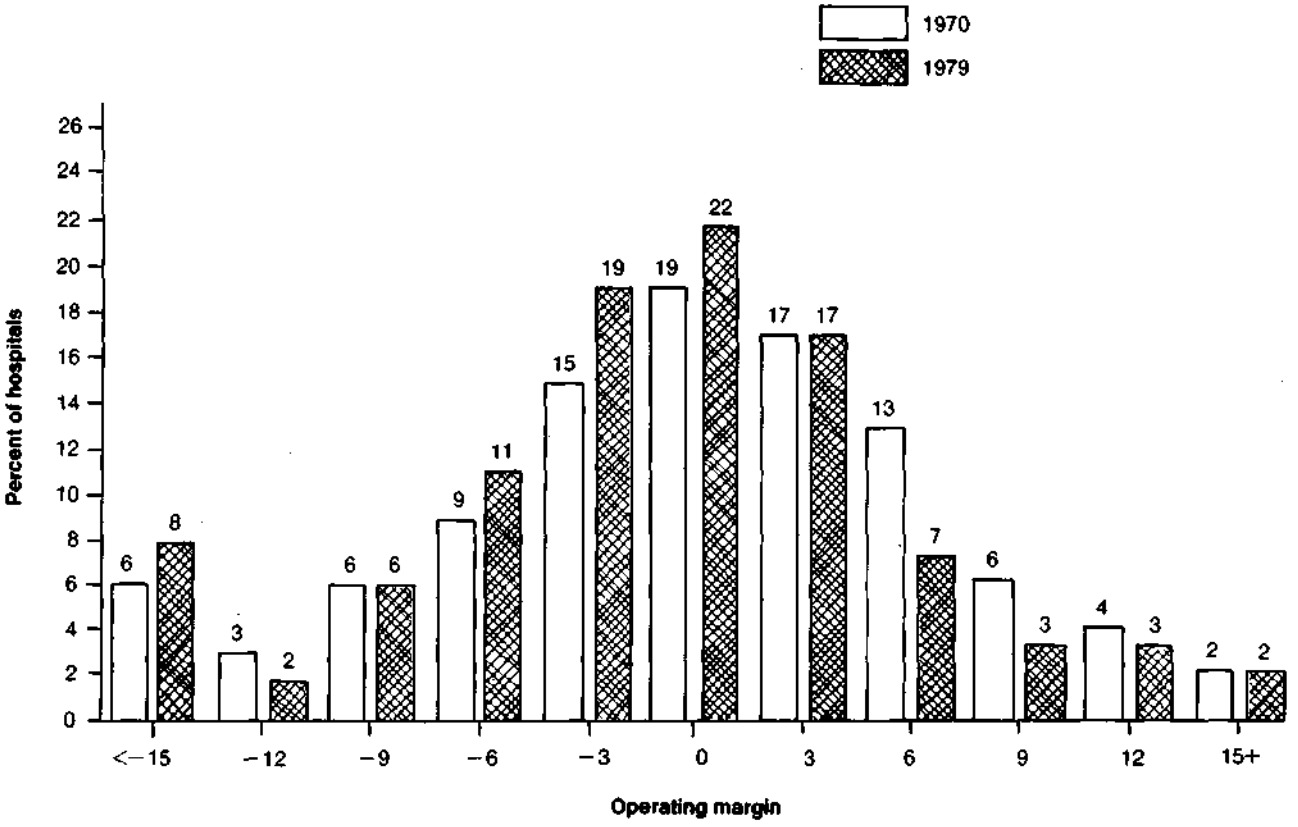
*25 percent or less of hospitals reporting in cell.

NOTE: Data are based on hospital averages not weighted by admissions, days, or bed size.

SOURCES: Abt Associates, Inc.: *National Hospital Rate-Setting Study.* Contract No. 500-78-0036. Prepared for the Health Care Financing Administration, Cambridge, Mass.; Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the Medicare cost reports for a 25-percent sample of U.S. short-term non-Federal hospitals.

Figure 1

Percent of hospitals, by operating margin per hospital: 1970 and 1979

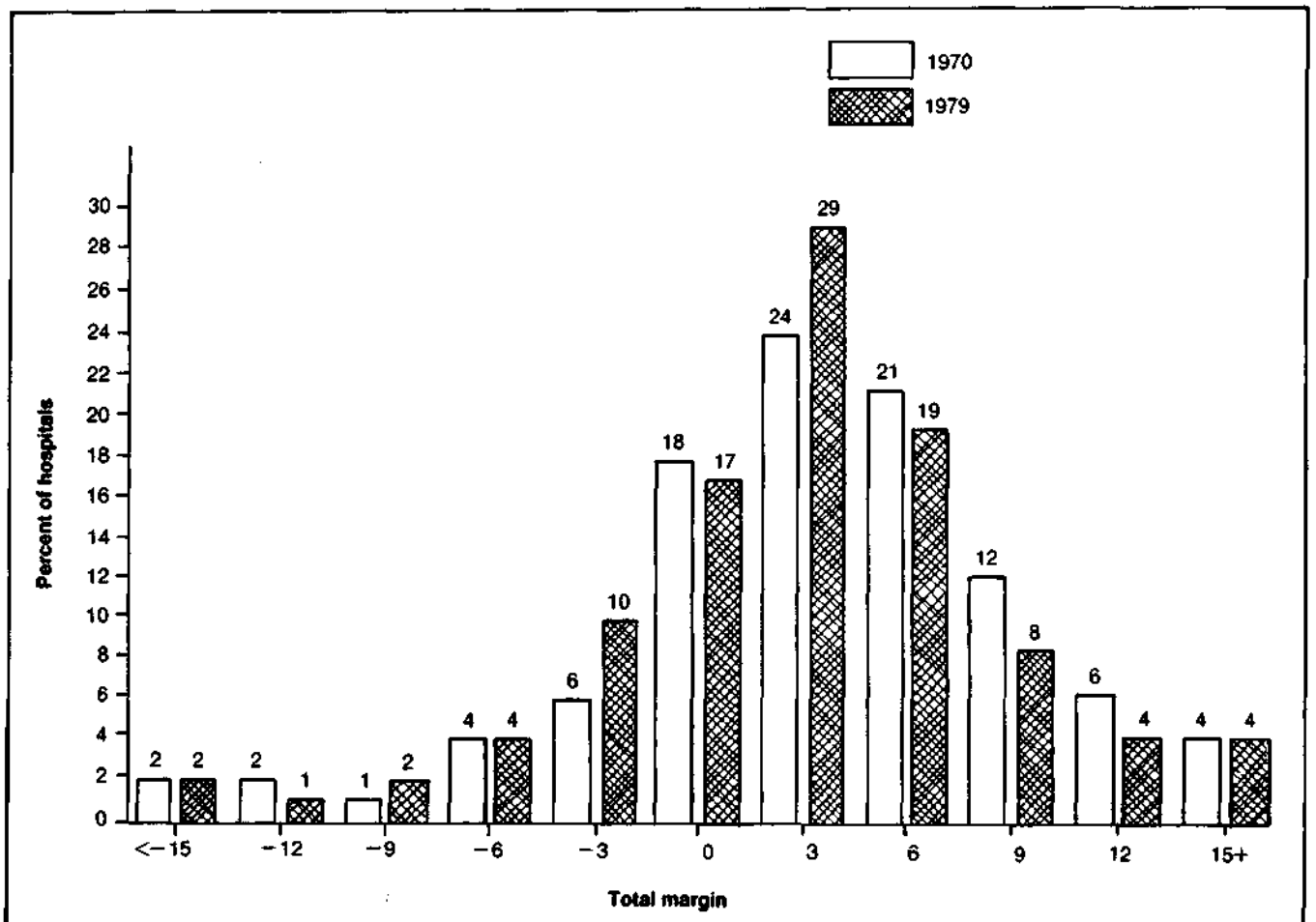


NOTE: Net operating income shown as percent of patient income.

SOURCES: Abt Associates, Inc.: *National Hospital Rate-Setting Study*. Contract No. 500-78-0036. Prepared for the Health Care Financing Administration. Cambridge, Mass. Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the Medicare cost reports for a 25-percent sample of U.S. short-term non-Federal hospitals.

Figure 2

Percent of hospitals, by total margin per hospital: 1970 and 1979



NOTE: Net total income shown as percent of total income.

SOURCES: Abt Associates, Inc.: *National Hospital Rate-Setting Study.* Contract No. 500-78-0036. Prepared for the Health Care Financing Administration. Cambridge, Mass. Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the Medicare cost reports for a 25-percent sample of U.S. short-term non-Federal hospitals.

Table 4

Hospital current ratio and long-term indebtedness, by area, teaching status, and type of hospital: 1970-79

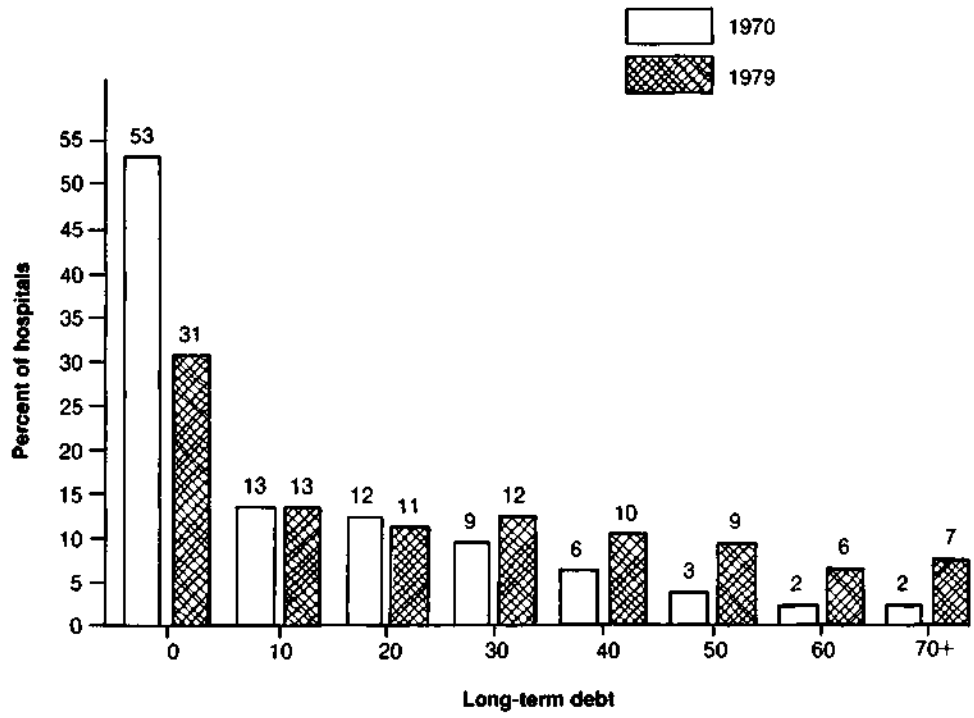
Area, teaching status, and type of hospital	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	Annual compound growth rate
						Current ratio					
Total	3.67	3.70	3.66	3.46	3.31	3.10	3.03	2.97	2.87	2.76	-3.2
Urban	3.06	3.00	2.91	2.77	2.66	2.55	2.56	2.48	2.40	2.29	-3.2
Rural	4.30	4.42	4.43	4.16	3.97	3.62	3.50	3.46	3.31	3.24	-3.1
Nonteaching	3.72	3.76	3.73	3.59	3.40	3.18	3.12	3.06	2.94	2.83	-3.0
Teaching	2.95	2.84	2.84	2.18	2.55	2.34	2.28	2.27	2.37	2.25	-3.0
Private voluntary	3.53	3.52	3.36	3.13	3.04	2.87	2.73	2.67	2.62	2.53	-3.7
Proprietary	2.61	2.87	2.87	3.01	2.56	2.52	2.44	2.42	2.07	2.33	-1.3
State and local government	4.51	4.50	4.70	4.36	4.24	3.86	3.92	3.83	3.71	3.42	-3.1
						Long-term indebtedness					
Total	13.5	16.0	16.4	17.4	19.0	20.6	21.5	23.1	23.5	25.3	7.0
Urban	17.1	19.8	20.7	23.2	23.3	26.4	27.2	28.7	29.1	31.0	6.6
Rural	10.1	12.0	12.1	11.6	14.7	15.3	15.8	17.4	18.4	19.6	7.4
Nonteaching	13.4	16.1	16.3	17.3	19.2	20.6	21.1	22.8	22.7	24.4	6.7
Teaching	14.8	14.7	16.6	18.2	17.0	20.4	24.7	25.6	29.2	31.7	8.5
Private voluntary	15.4	18.6	18.1	19.3	20.5	22.5	22.8	24.7	25.0	28.3	6.8
Proprietary	16.9	20.9	23.4	25.3	30.0	31.9	35.2	35.6	35.8	34.9	8.1
State and local government	7.9	7.8	9.2	9.5	10.1	10.7	12.1	14.0	15.1	15.2	7.3

NOTE: Data are based on hospital averages not weighted by admissions, days, or bed size.

SOURCES: Abt Associates, Inc.: *National Hospital Rate-Setting Study*. Contract No. 500-78-0036. Prepared for the Health Care Financing Administration. Cambridge, Mass.; Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the Medicare cost reports for a 25-percent sample of U.S. short-term non-Federal hospitals.

Figure 3

Percent of hospitals, by long-term indebtedness: 1970 and 1979



NOTE: Long-term debt shown as percent of net total assets.

SOURCES: Abt Associates, Inc.: *National Hospital Rate-Setting Study*. Contract No. 500-78-0036. Prepared for the Health Care Financing Administration. Cambridge, Mass. Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the Medicare cost reports for a 25-percent sample of U.S. short-term non-Federal hospitals.

although the latter were slowly catching up in the 1970's. Public hospitals also took on debt at only one-half the rate of other hospitals, which is explained by their access to public tax monies. Proprietary hospitals were the most indebted by 1979 (35 percent) even though they started the decade at rates similar to those of other private voluntary hospitals.

The frequency distribution of hospitals according to their long-term indebtedness is shown in Figure 3. In 1970, over one-half of all hospitals had little or no debt (less than 5 percent), and only 7 percent were "heavily indebted"—i.e., above 45 percent. By 1979, the distribution had changed radically. Only one of every three hospitals still were debt free, and one of every five could be considered heavily indebted. Interestingly, the proportion of hospitals with modest debt (5-25 percent) changed little over the decade, with most of the change coming at the extremes of the distribution.

National trends in hospital utilization

Utilization growth contributed in only a minor way to the observed expense growth, as shown in Tables 5 and 6. Total inpatient admissions per hospital grew only about 2 percent annually; and inpatient days grew only 1.2 percent, as overall length of stay fell a full day from 7.52 to 6.54 days. At most, admissions growth explained only one-sixth (2%/12%) of the 12 percent annual expense growth over the period. Admissions to proprietary hospitals grew over twice as fast (4.6 percent) as the national average, and those to State and local hospitals grew hardly at all (1 percent annually).

Medicare admissions per hospital, in distinct contrast, grew much faster, 5.7 percent annually. In one decade, Medicare's share of the typical hospital's admissions went from one-quarter to one-third (Table 5). This trend extended to all hospital groups, including proprietaries. The growing dependency of teaching hospitals on Medicare admissions is particularly noteworthy. More important, though, was the 2-day decline in Medicare length of stay, which saved several hundred dollars per stay in routine care alone across all hospitals. Nevertheless, as late as 1981, Medicare's average length of stay (9.3 days) was 43 percent longer than that for the hospital as a whole (including Medicare patients).

Total hospital days grew very slowly between 1970 and 1981 because of shorter stays (Table 5). At the same time, average bed size grew (Table 7), putting additional downward pressure on occupancy rates. By 1981, the (unweighted) hospital occupancy rate had fallen to 66 percent from a high of 72 percent in 1970 (Table 6). On a typical day at the end of 1970's, one of every three short-term hospital beds went unused. After levelling off in 1978, this downward trend in capacity utilization accelerated once again in the 1980's with the introduction of Medicare's prospective payment system. By 1984, the rate was below 64 percent (American Hospital Association, 1985).

Trends in hospital capital formation

Hospital growth is shown in yet another way, by the beds, buildings, and equipment employed (Tables 7 and 8). Hospital bed size grew steadily over 1970-81 from 146 to 176 beds, an addition of 30 beds per hospital on the average. A detailed bed-size breakdown can be found in Cromwell, et al., 1986. Although significant in itself, the book value of undeflated net fixed assets, net of accumulated depreciation, grew many times faster. In 1971, the first year fixed asset data were collected in the study, the average hospital reported slightly over $3 million in net buildings, land, and fixed and movable equipment. By 1979, the figure had more than doubled to $7,343,000. After factoring out the growth in bed size (values not shown), net fixed capital per bed almost exactly doubled from $17,367 to $35,440, a compound growth of nearly 9 percent annually. On a per admission basis, see bottom of Table 7, the rate of growth was only slightly lower (8.2 percent annually).

The frequency distribution of net total fixed assets per hospital in constant 1969 dollars is shown in Figure 4.[4] The bars for 1979 show the distribution at the end of the decade, factoring out the inflation in construction and equipment costs, making the 1971 and 1979 figures comparable in real terms. Only 1 of every 25 hospitals (4 percent) had real net assets of over $13.5 million in 1971. By 1979, this frequency had risen to one of every seven (14 percent). This increase occurred in essentially all but the very small hospitals.

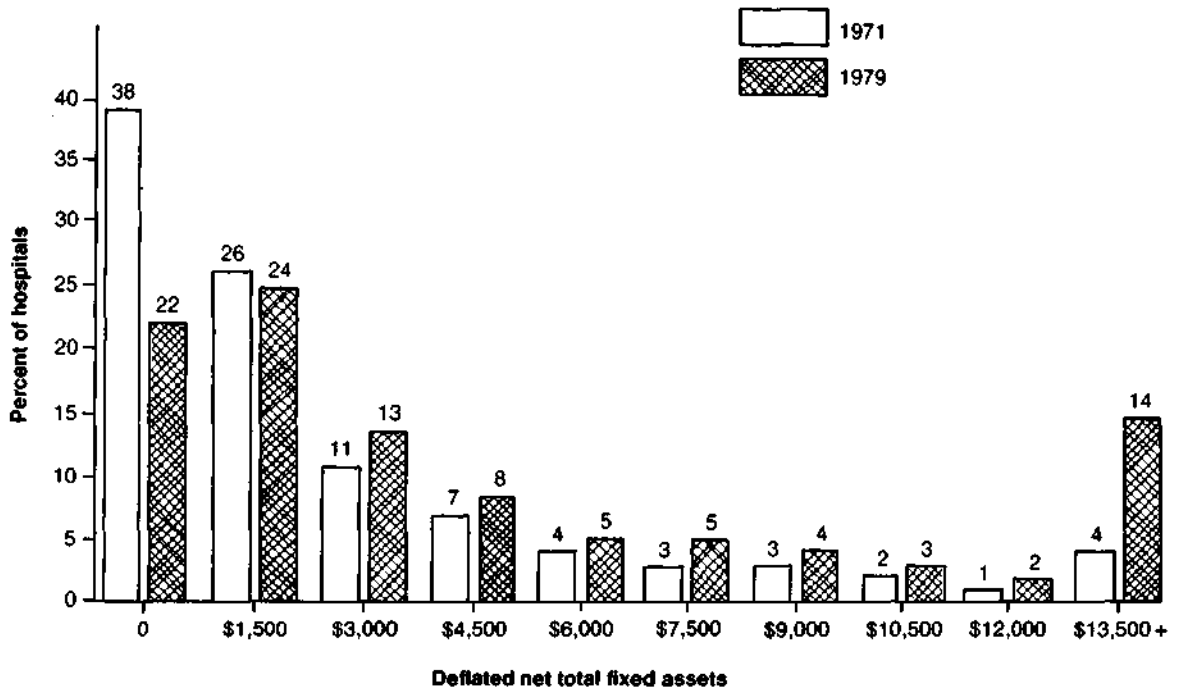
Deflating the change in net fixed assets provides a rough measure of real capital formation on an annual basis (Table 8). Capital formation in the hospital industry peaked in the mid-1970's at $467,000 per hospital (in 1969 dollars), then fell back to rates observed at the beginning of the decade. If the 1971 nominal fixed asset figure of $3 million is taken as the base, then the price-adjusted real capital formation rates range between 4.3 (1971) and 10.6 (1976) percent of the base, itself adjusted upwards annually only for real capital additions. These are relatively high investment rates compared with other U.S. industries and are indicative of the major expansion in the sector over the last 10-15 years.

Rates of real capital formation varied significantly across the years, as well as by hospital location, teaching status, and ownership. Teaching hospitals invested roughly six times as much annually as nonteaching hospitals, and urban hospitals invested about four times as much as their rural counterparts. The typical short-term hospital added $2.66 million in real plant and equipment between 1971 and 1979. This varied from teaching hospitals, which invested over $10 million, to the small rural hospitals, which added less than $1 million. Proprietaries and public hospitals

[4]Over the 1969-79 period, construction prices rose 14.4 percent, and the professional and scientific equipment index rose 73 percent.

Figure 4

Percent of hospitals, by net total fixed assets per hospital: 1971 and 1979



NOTE: Assets are constant 1969 dollars.

SOURCES: Abt Associates, Inc.: *National Hospital Rate-Setting Study*. Contract No. 500-78-0036. Prepared for the Health Care Financing Administration. Cambridge, Mass. Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the Medicare cost reports for a 25-percent sample of U.S. short-term non-Federal hospitals.

each invested about $1.5 million in real terms over the decade.

The 9-year gross investment in real movable equipment was $1.26 million, or $139,000 annually per hospital. The rate peaked in 1978 at $193,000 per hospital (in 1969 dollars). Teaching hospitals in that year averaged $733,000 in new equipment compared with only $58,000 among rural hospitals. When cumulated over the entire 1971-79 period, the average teaching hospital purchased nearly $5 million in new equipment versus less than $1 million for those without a teaching affiliation. The typical rural hospital spent only $436,000 over the entire decade for equipment, which is only 60 percent of what the average teaching hospital spent in 1978 alone. The typical proprietary and public hospital spent roughly $600,000 each on equipment over the 1970's, which was only about one-third the rate for private voluntary hospitals.

With such high rates of real capital formation, it is not surprising that the average age of hospital capital remained relatively constant. This is indicated by the last eight lines of Table 8 that show the average percent of building and fixed equipment assets that had been depreciated on the hospitals' books. (Movable equipment has been removed because of its far shorter economic lifetime.) The national figures fall in the narrow range of 32-35 percent, implying that roughly one-third of the useful building lifetime had been depreciated, or 8-10 years on a 25- 30-year base. Only a slight aging in the stock is observed in 9 years, regardless of location or ownership.

Table 5

Number of inpatient admissions, percent Medicare admissions, and number of inpatient days, by area, teaching status, and type of hospital: 1970-81

Area, teaching status, and type of hospital	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	Annual compound growth rate
						Inpatient admissions per hospital							
Total	5,196	5,243	5,366	5,564	5,731	5,789	5,902	5,970	6,072	6,274	6,488	6,577	2.1
Urban	7,735	7,757	7,922	8,182	8,392	8,459	8,642	8,759	8,944	9,106	9,457	9,619	2.0
Rural	2,638	2,656	2,724	2,831	2,894	2,940	2,999	3,019	3,044	3,132	3,087	3,138	1.6
Nonteaching	4,376	4,371	4,447	4,360	4,513	4,580	4,614	4,519	4,567	4,729	4,933	5,024	1.3
Teaching	15,398	15,982	16,312	16,305	16,229	16,272	16,542	16,432	16,772	17,085	17,391	17,327	1.1
Private voluntary	6,405	6,524	6,679	6,999	7,246	7,231	7,348	7,443	7,549	7,774	8,013	8,153	2.2
Proprietary	2,815	2,867	3,006	3,127	3,360	3,613	3,990	4,063	4,189	4,387	4,666	4,655	4.6
State and local government	3,878	3,772	3,837	3,893	3,910	3,987	3,936	3,916	3,985	4,132	4,291	4,336	1.0
						Percent Medicare admissions							
Total	24.9	25.0	25.3	25.8	27.1	27.7	28.8	30.1	31.2	31.7	32.6	34.0	2.8
Urban	21.3	21.4	21.8	22.3	23.6	24.1	25.3	26.9	28.1	28.4	29.6	31.0	3.4
Rural	28.4	28.7	28.9	29.3	30.9	31.5	32.4	33.4	34.5	35.0	36.0	37.3	2.5
Nonteaching	25.4	25.6	25.9	26.5	27.8	28.3	29.5	30.9	32.1	32.5	33.5	35.0	2.9
Teaching	17.6	17.5	18.2	19.2	21.3	22.1	23.0	24.3	25.4	25.6	26.7	27.4	4.0
Private voluntary	23.5	23.3	23.7	24.3	25.7	26.3	27.6	28.8	29.9	30.5	31.6	32.9	3.1
Proprietary	25.2	26.2	25.8	26.1	26.8	27.0	26.9	29.4	31.0	31.4	31.6	33.8	2.7
State and local government	27.8	27.9	28.4	28.6	30.1	30.7	32.0	33.1	34.1	34.1	35.2	36.3	2.4
						Inpatient days per hospital							
Total	41,199	40,789	41,020	41,836	42,738	42,892	43,529	43,683	43,929	45,180	46,502	47,126	1.2
Urban	63,763	62,722	63,068	64,265	65,508	65,783	66,923	67,387	68,141	69,809	70,896	72,371	1.2
Rural	18,493	18,175	18,193	18,418	18,528	18,499	18,723	18,591	18,533	18,846	18,415	18,626	0.1
Nonteaching	32,922	32,275	32,303	30,798	31,523	31,602	31,725	30,605	30,741	31,699	33,032	33,527	0.2
Teaching	144,499	145,708	144,831	139,560	139,447	140,158	140,941	137,969	138,397	139,738	141,106	141,080	−0.2
Private voluntary	51,905	52,016	52,549	54,131	55,593	55,362	56,081	56,336	56,581	58,189	59,692	60,648	1.4
Proprietary	19,096	19,204	19,643	20,467	21,837	23,316	25,738	26,011	26,842	27,956	29,386	30,009	4.1
State and local government	30,122	28,305	27,940	27,784	27,710	27,660	27,032	26,649	26,590	27,212	28,195	28,343	−0.6

NOTE: Data are based on hospital averages not weighted by admissions, days, or bed size.

SOURCES: Abt Associates, Inc.: *National Hospital Rate-Setting Study*. Contract No. 500-78-0036. Prepared for the Health Care Financing Administration. Cambridge, Mass.; Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the Medicare cost reports for a 25-percent sample of U.S. short-term non-Federal hospitals.

Table 6

Lengths of stay and occupancy rates, by area, teaching status, and type of hospital, 1970-81

Area, teaching status, and type of hospital	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	Annual compound growth rate
							Length of stay in days						
Total	7.52	7.34	7.15	6.98	6.88	6.76	6.72	6.66	6.62	6.57	6.64	6.54	-1.3
Urban	7.91	7.78	7.62	7.49	7.40	7.33	7.32	7.31	7.29	7.25	7.20	7.22	-0.8
Rural	7.12	6.88	6.66	6.44	6.33	6.16	6.08	5.97	5.91	5.85	5.99	5.77	-1.9
Nonteaching	7.38	7.20	7.01	6.79	6.69	6.56	6.52	6.43	6.40	6.35	6.43	6.32	-1.4
Teaching	9.18	9.04	8.84	8.63	8.52	8.48	8.39	8.31	8.22	8.15	8.07	8.05	-1.2
Private voluntary	7.77	7.64	7.48	7.31	7.21	7.11	7.10	7.05	6.99	6.94	6.90	6.91	-1.1
Proprietary	7.05	6.86	6.61	6.55	6.50	6.42	6.30	6.24	6.38	6.34	6.77	6.31	-1.0
State and local government	7.23	6.96	6.75	6.53	6.42	6.24	6.17	6.06	5.99	5.96	6.04	5.90	-1.8
							Medicare length of stay in days						
Total	11.90	11.53	11.18	11.00	10.75	10.43	10.19	9.85	9.65	9.52	9.45	9.33	-2.2
Urban	12.73	12.38	12.11	11.99	11.79	11.56	11.31	10.96	10.76	10.69	10.58	10.47	-1.8
Rural	11.08	10.67	10.23	9.96	9.63	9.23	9.01	8.71	8.52	8.31	8.17	8.08	-2.9
Nonteaching	11.73	11.34	10.98	10.72	10.45	10.12	9.86	9.50	9.31	9.16	9.11	8.98	-2.4
Teaching	14.25	13.91	13.51	13.53	13.33	13.15	12.86	12.46	12.12	12.08	11.83	11.80	-1.7
Private voluntary	12.50	12.16	11.80	11.57	11.40	11.10	10.91	10.59	10.37	10.20	10.08	10.04	-2.0
Proprietary	10.91	10.61	10.58	10.53	10.26	9.94	9.62	9.27	9.09	9.03	9.25	8.79	-2.0
State and local government	11.13	10.65	10.18	10.09	9.69	9.33	9.01	8.63	8.46	8.38	8.28	8.20	-2.8
							Occupancy rate						
Total	72	70	68	68	68	66	66	65	65	65	66	66	-0.8
Urban	77	75	73	73	73	72	71	70	70	71	72	73	-0.5
Rural	68	65	64	63	62	61	60	59	59	59	59	59	-1.3
Nonteaching	72	69	67	67	66	65	64	63	63	63	65	64	-1.1
Teaching	82	81	80	80	81	80	79	79	78	78	79	80	-0.2
Private voluntary	75	73	71	72	72	70	70	69	69	69	70	71	-0.5
Proprietary	71	69	67	65	65	63	63	62	61	63	64	63	-1.1
State and local government	68	65	63	63	62	61	60	59	58	59	59	59	-1.3

NOTE: Data are based on hospital averages not weighted by admissions, days, or bed size.

SOURCES: Abt Associates, Inc.: *National Hospital Rate-Setting Study*. Contract No. 500-78-0036. Prepared for the Health Care Financing Administration. Cambridge, Mass.; Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the Medicare cost reports for a 25-percent sample of U.S. short-term non-Federal hospitals.

Table 7

Number of hospital beds and net total fixed assets by area, teaching status, and type of hospital: 1970-81

Area, teaching status, and type of hospital	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	Annual compound growth rate
						Number of beds							
Total	146	148	151	155	158	161	164	168	170	173	173	176	1.7
Urban	217	218	222	226	230	236	240	246	251	254	252	255	1.5
Rural	72	74	75	77	79	79	80	81	83	83	81	85	1.5
Nonteaching	120	119	122	118	121	124	124	124	126	128	128	131	0.8
Teaching	470	492	491	483	481	487	490	486	489	492	491	494	0.5
Private voluntary	181	183	188	194	199	202	204	209	212	215	214	219	1.7
Proprietary	72	74	75	86	91	99	107	110	113	119	119	121	4.7
State and local government	112	111	113	111	111	112	111	112	112	114	115	117	0.4
						Net total fixed assets per hospital in undeflated dollars							
Total	NA	$3,099	$3,404	$3,815	$4,201	$4,781	$5,545	$6,402	$6,963	$7,343	NA	NA	10.8
Urban	NA	4,921	5,411	6,107	6,743	7,742	9,043	10,461	11,462	12,130	NA	NA	11.3
Rural	NA	1,242	1,375	1,458	1,602	1,751	1,950	2,232	2,448	2,755	NA	NA	10.0
Nonteaching	NA	2,269	2,564	2,624	2,877	3,348	3,619	3,958	4,510	4,783	NA	NA	9.3
Teaching	NA	13,286	13,502	15,100	16,333	17,949	21,857	24,437	24,780	26,279	NA	NA	8.5
Private voluntary	NA	4,128	4,500	5,103	5,635	6,548	7,262	8,209	9,019	9,849	NA	NA	10.9
Proprietary	NA	694	1,123	1,438	1,767	2,068	2,422	2,667	2,983	3,448	NA	NA	20.0
State and local government	NA	2,157	2,260	2,410	2,574	2,602	3,638	4,521	4,623	4,093	NA	NA	8.0
						Net total fixed assets per adjusted admission in undeflated dollars							
Total	NA	$486	$526	$539	$591	$664	$722	$791	$860	$937	NA	NA	8.2
Urban	NA	548	603	621	684	786	852	929	1,014	1,087	NA	NA	8.6
Rural	NA	414	441	446	484	526	576	639	694	780	NA	NA	7.9
Nonteaching	NA	462	506	509	558	626	668	717	788	864	NA	NA	7.8
Teaching	NA	777	770	811	880	1,001	1,176	1,326	1,382	1,457	NA	NA	7.9
Private voluntary	NA	556	596	610	665	761	833	890	962	1,037	NA	NA	7.8
Proprietary	NA	236	292	325	395	447	470	520	589	713	NA	NA	13.8
State and local government	NA	451	494	502	538	572	614	715	776	831	NA	NA	7.6

NOTES: Data are based on hospital averages not weighted by admissions, days, or bed size. NA is data not available.

SOURCES: Abt Associates, Inc.: *National Hospital Rate-Setting Study*. Contract No. 500-78-0036. Prepared for the Health Care Financing Administration. Cambridge, Mass.; Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the Medicare cost reports for a 25-percent sample of U.S. short-term non-Federal hospitals.

Table 8

Changes in hospital net total fixed assets and gross movable equipment and depreciation rates, by area, teaching status, and type of hospital: 1971-79

Area, teaching status, and type of hospital	1971	1972	1973	1974	1975	1976	1977	1978	1979	9-year total	Annual compound growth rate
					Change in net total fixed assets per hospital in deflated dollars						
Total	$134	$300	$281	$275	$303	$467	$374	$267	$263	$2,664	—
Urban	211	494	483	423	525	801	608	429	361	4,335	—
Rural	57	103	74	121	79	124	135	103	170	966	—
Nonteaching	71	247	202	220	180	225	183	192	254	1,774	—
Teaching	935	937	1,034	774	1,440	2,569	1,791	807	329	10,616	—
Private voluntary	199	341	381	347	446	487	465	323	545	3,534	—
Proprietary	60	271	226	306	131	30	60	211	108	1,403	—
State and local government	37	228	108	114	104	639	341	179	−230	1,520	—
					Change in movable equipment per hospital in deflated dollars						
Total	$66	$108	$122	$133	$121	$174	$188	$193	$150	$1,255	—
Urban	109	154	209	214	215	289	325	329	238	2,082	—
Rural	24	65	38	51	27	60	52	58	61	436	—
Nonteaching	62	94	58	96	68	105	126	121	109	839	—
Teaching	121	273	732	477	626	781	651	733	453	4,847	—
Private voluntary	91	125	168	185	170	252	242	259	201	1,693	—
Proprietary	55	69	71	63	58	56	53	110	66	601	—
State and local government	17	91	53	60	52	74	143	98	82	670	—
					Depreciation rate						
Total	32.0	32.1	32.0	32.1	32.7	32.9	33.7	35.0	34.9	—	1.1
Urban	30.9	30.7	30.4	30.5	30.4	31.2	32.4	34.4	34.1	—	1.2
Rural	33.0	33.4	33.3	33.5	34.6	34.5	34.9	35.7	35.7	—	1.0
Nonteaching	31.9	32.1	31.8	31.8	32.5	32.8	33.7	34.7	35.3	—	1.3
Teaching	34.0	32.1	33.2	35.7	34.4	33.8	33.3	37.9	32.0	—	−0.8
Private voluntary	32.0	32.7	32.5	33.1	33.0	33.2	33.8	34.8	34.4	—	0.9
Proprietary	34.7	32.1	29.5	27.6	29.7	29.1	34.2	34.8	36.5	—	0.6
State and local government	30.7	30.9	32.1	32.5	33.6	34.3	33.2	35.7	35.3	—	1.7

NOTE: Data are based on hospital averages not weighted by admissions, days, or bed size.

SOURCES: Abt Associates, Inc.: *National Hospital Rate-Setting Study.* Contract No. 500-78-0036. Prepared for the Health Care Financing Administration. Cambridge, Mass.; Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the Medicare cost reports for a 25-percent sample of U.S. short-term non-Federal hospitals.

Hospital employees and salaries

Labor input also grew significantly during the 1970's (Table 9). The number of full-time equivalent (FTE) employees per 100 admissions went from 5.28 in 1970 to 6.68 in 1981, a 2.1 annual percent change. This amounts to a 27-percent increase in the labor-output ratio in just 11 years. Teaching hospitals used roughly 50 percent more labor per admission in 1970 than nonteaching hospitals, but this gap narrowed to 40 percent by 1981. The labor-per-admission ratio grew fastest among proprietary hospitals (2.8 percent annually), although their 5.9 FTE's were still the lowest of any hospital group by 1981.

Salary expenses per FTE practically doubled over the 1970-79 period. Moreover, salary expenses per adjusted inpatient admission grew steadily from $296 in 1970 to $693 in 1979, an annual compound rate of growth of 9.5 percent. The more expensive mix of personnel in teaching hospitals is reflected in an average salary 34 percent above that in nonteaching hospitals, although the decadal inflation in salaries was very similar in both hospital types.

Discussion

As the data clearly indicate, the 1970's witnessed a major transformation of the hospital industry, primarily in response to expanding insurance coverage: not that admissions or inpatient days grew that fast with broader insurance, only 1-2 percent per year. Rather, intensity of care per admission mushroomed under the highly favorable climate of cost-based payment. Expenses per day grew a remarkable 13.5 percent per year, led by ancillary services that became almost one-half of all costs.

Such inflation over so short a time had profound effects on the ability of private citizens to purchase hospital services on their own. A day in the typical hospital, which cost only $70 in 1970, rose to $300 just 11 years later, and an entire admission averaged nearly $2,000. Care in a teaching hospital became even more unaffordable (over $3,000 per admission) without extensive insurance coverage.

Operating for the most part in a cost pass-through regime, the industry's labor-output ratio grew a steady 2 percent yearly; while at the same time, the capital-output ratio grew several times faster. The average hospital added over $2.5 million to its real assets on a base of just $3 million to begin the decade. At the extreme, teaching hospitals added over $10 million on a base of $13 million.

Huge labor and capital needs had pronounced effects on the industry's operating and financial performance. Profit rates fell during the early 1970's as revenues lagged behind intensity growth, and indebtedness doubled to support the rapid bed expansion or renovation and even higher rates of equipment investment. Occupancy rates fell as beds outpaced utilization growth that never reached expected levels because of shorter stays.

Essentially all types of hospitals participated in this transformation: rural hospitals, teaching hospitals, public, and private hospitals. Indeed, with a few important exceptions, such as the continually positive profit rates of proprietaries and the low indebtedness of publics, the similarity among hospitals is striking. All became far more intensive, all invested large sums in new buildings and equipment, and all hired many new employees to service patients and manage a much larger organization.

Proprietary hospitals were exceptional only in their aggressivity. Whereas average bed size grew 20 percent in 11 years, proprietary bed size grew 70 percent. Whereas the typical hospital added 85 percent to its real capital stocks, the average proprietary added 200 percent. Consequently, proprietaries surpassed public hospitals in size over the decade (although still only one-half the size of private voluntaries). Most of this expansion was justified, however, by utilization growth 2-3 times above average.

Thus, at the turn of the 1980's, Federal, State, and local policymakers had a very different industry to contend with, one that had become "big business" in local communities in terms of jobs, construction, and purchasing. Its cost structure had put its services beyond the means of uninsured individuals and made it almost totally dependent on third-party payers—and especially Medicare. Its bottom-line financial picture was definitely on the upswing, in no small part a result of growing sources of nonpatient care income.

A few disturbing vestiges of this transformation remained, however. For example, only two out of every three beds were in use on a typical day; and for rural and public hospitals, capacity utilization was even lower and falling rapidly. Lengths of stay varied systematically across large regions and hospitals in ways unexplained by epidemiological factors. Finally, huge investments in beds and equipment incurred in the 1960's and 1970's were coming up for renewal in the 1980's, necessitating even greater indebtedness and another round of cost passthroughs.

Simple, painless solutions were not obvious. Controlling economy-wide inflation would help, but at no point during the 1970's was it the driving force behind the industry's escalating costs. Depressed utilization among rural and public hospitals indicated the need for more closures and mergers, but which hospitals? Hospital planning had been more effective in keeping local institutions open than in making the tough choices of which to close. And the drastic differences in cost structures across hospitals pointed to waste and inefficient operations, but how could one distinguish slack from legitimate differences in area wages and case-mix severity?

Two approaches gained favor in the 1980's, both emanating from earlier cost control efforts. In the 1960's and 1970's, the health maintenance organization movement, with its capitated payment arrangement, had already proven its effectiveness in reducing costly inpatient admissions in a younger, working population (Luft, 1981). Whether it will have continued success on older, less well populations

Table 9

Number of hospital full-time equivalent (FTE) employees and salary expenses, by area, teaching status, and type of hospital: 1970-81

Area, teaching status, and type of hospital	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	Annual compound growth rate
						FTE employees per 100 admissions							
Total	5.28	5.19	5.38	5.35	5.48	5.61	5.70	5.87	5.96	6.10	6.16	6.68	2.1
Urban	5.72	5.72	5.90	5.91	6.04	6.21	6.31	6.55	6.67	6.74	6.79	7.20	2.1
Rural	4.81	4.64	4.82	4.75	4.86	4.97	5.04	5.12	5.20	5.40	5.44	6.09	2.1
Nonteaching	5.07	4.96	5.14	5.05	5.17	5.30	5.37	5.53	5.62	5.77	5.81	6.37	2.1
Teaching	7.90	7.97	8.13	7.97	8.09	8.23	8.40	8.28	8.39	8.37	8.62	8.84	1.0
Private voluntary	5.58	5.49	5.65	5.58	5.71	5.86	5.96	6.18	6.30	6.46	6.51	7.12	2.2
Proprietary	4.36	4.30	4.40	4.50	4.73	4.80	4.93	5.04	5.15	5.38	5.39	5.92	2.8
State and local government	5.13	5.03	5.33	5.32	5.39	5.51	5.57	5.62	5.64	5.71	5.80	6.18	1.7
						Salary expenses per FTE							
Total	$5,389	$5,811	$6,204	$6,495	$6,940	$7,654	$8,251	$8,913	$9,721	$10,542	NA	NA	7.5
Urban	6,023	6,479	6,976	7,290	7,842	8,665	9,255	10,031	10,925	11,718	NA	NA	7.4
Rural	4,680	5,081	5,369	5,630	5,966	6,562	7,185	7,707	8,405	9,234	NA	NA	7.6
Nonteaching	5,304	5,694	6,060	6,271	6,710	7,426	7,964	8,595	9,354	10,150	NA	NA	7.2
Teaching	6,557	7,297	7,963	8,538	8,958	9,732	10,703	11,236	12,383	13,395	NA	NA	7.9
Private voluntary	5,538	5,992	6,485	6,745	7,212	7,976	8,618	9,330	10,234	11,022	NA	NA	7.6
Proprietary	5,865	6,156	6,483	6,788	7,421	8,224	8,460	9,045	9,643	10,660	NA	NA	6.6
State and local government	4,799	5,248	5,465	5,850	6,155	6,715	7,409	8,007	8,732	9,528	NA	NA	7.6
						Salary expenses per adjusted admission							
Total	$296	$326	$352	$368	$402	$449	$497	$556	$623	$693	NA	NA	9.5
Urban	353	395	437	454	499	553	613	691	767	849	NA	NA	9.8
Rural	232	250	260	275	299	338	375	414	468	525	NA	NA	9.1
Nonteaching	277	302	324	328	357	405	445	497	558	623	NA	NA	9.0
Teaching	553	632	685	736	796	857	939	992	1,098	1,202	NA	NA	8.6
Private voluntary	325	357	392	402	438	501	551	615	690	768	NA	NA	9.6
Proprietary	252	278	290	310	351	381	412	461	526	598	NA	NA	9.6
State and local government	254	284	299	329	355	380	429	482	532	588	NA	NA	9.3

NOTES: Data are based on hospital averages not weighted by admissions, days, or bed size. NA is data not available.

SOURCES: Abt Associates, Inc.: *National Hospital Rate-Setting Study*. Contract No. 500-78-0036. Prepared for the Health Care Financing Administration. Cambridge, Mass.; Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the Medicare cost reports for a 25-percent sample of U.S. short-term non-Federal hospitals.

remains unknown. The novel Medicare prospective payment system, with its fixed payment per admission, also had empirical support from the many State rate-setting programs implemented in the previous decade (Coelen and Sullivan, 1981; Morrisey et al., 1982; Biles, et al., 1980). Prospective payment per admission or per day was found effective in reining burgeoning intensity and in trimming waste in costly hospitals.

How well the new, very intensive and financially mature hospital industry of the 1980's will respond to the simultaneous pressures of fewer admissions and less intensive care is the policy question of the 1980's and 1990's. Extending Medicare and Medicaid coverage to millions of Americans played a signal role in altering the mode of inpatient care, not to mention the way in which we all think and use our local hospitals. Services that were uncovered on an outpatient basis were covered if one was lying in an expensive hospital bed. Ironically, the predictable response of the industry to carte blanche insurance coverage has led, in a very short time, to yet another rethinking of the hospital's role, one which focuses even more than in the past on truly acute, expeditious care for all illnesses for all patients with a greater emphasis on outpatient care of all kinds.

Acknowledgments

We would like to thank Richard Yaffe and Michael Fitzmaurice, Project Officers at the Health Care Financing Administration, for their comments and support.

References

American Hospital Association: *Hospital Statistics, 1985 Edition*. Chicago. AHA Publications, 1985.

Biles, B., Shramm, C., and Atkinson, J.: Hospital cost inflation under State rate-setting programs. *The New England Journal of Medicine* 303(12):664-668. Sept. 18, 1980.

Cleverley, W., *Essentials of Hospital Finance*, Germantown, Md. Aspen Systems, 1978.

Coelen, C., and Sullivan, D.: An analysis of the effects of prospective reimbursement programs on hospital expenditures. *Health Care Financing Review*. Vol. 2, No. 3. HCFA Pub. No. 03090. Office of Research, Demonstrations, and Statistics, Health Care Financing Administration. Washington. U.S. Government Printing Office, Winter 1981.

Coelen, C., Mennemeyer, S., and Kidder, D.: *Effects of Prospective Reimbursement Programs on Hospital Revenue, Expense and Financial Status*. Vols. I and II, Final Report. Contract No. 500-78-0036. Prepared for Health Care Financing Administration. *Cambridge, Mass.* May 1985.

Cromwell, J., Hewes, H., Kelly, N., and Franklin, S.: *Comparative Trends in Hospital Expenses, Finances, Utilization, and Inputs over the 1970-81 Period*. Final Report. Contract No. 500-78-0036. Prepared for Health Care Financing Administration. Needham, Mass. July 1986.

Department of Health and Human Services: *The 1985 Annual Report to Congress: The Impact of the Medicare Hospital Prospective Payment System*, 1986.

Federal Register: Medicare program; changes in inpatient hospital prospective payment system and fiscal year 1987 rates. Proposed Rule. Part IV, Department of Health and Human Services, HCFA, 42 CFR Parts 405 and 412. Office of the Federal Register, National Archives and Records Administration. Washington. U.S. Government Printing Office, June 3, 1986.

Freeland, M., and Schendler, C.: National health expenditures: Short-term outlook and long-term projections. *Health Care Financing Review*. Vol. 2, No. 3. HCFA Pub. No. 03090. Office of Research, Demonstrations and Statistics, Health Care Financing Administration. Washington. U.S. Government Printing Office, Winter 1981.

Luft, H. S.: *Health Maintenance Organizations: Dimensions of Performance*. New York. Wiley-Interscience, 1981.

Morrisey, M., Sloan, F., and Mitchell, S.: State rate-setting: An analysis of some unresolved issues. *Health Affairs* 2(2):84-98, Summer 1982.

Muse, D. and Sawyer, D.: *The Medicare and Medicaid Data Book, 1981*. Health Care Financing Program Statistics. HCFA Pub. No. 03156. Office of Research and Demonstrations, Health Care Financing Administration. Washington. U.S. Government Printing Office, 1982.