

Health Care Financing Note

Hospital and Medicare financial performance under PPS, 1985-90

by Charles R. Fisher

Although an increasing number of hospitals are reporting net losses from the Medicare prospective payment system (PPS) for inpatient care, overall hospital facility profit rates remain stable. Hospitals that reported net profits in the Medicare inpatient PPS sector in PPS 7 (1990) had smaller increases in Medicare expenses than hospitals that reported PPS losses in PPS 7. Medicare PPS inpatient net losses in PPS 7 were more than offset by non-Medicare net profits. Even though Medicare PPS revenues grew more slowly than the gross domestic product from 1985 to 1990, other hospital revenues grew more rapidly.

Introduction

The prospective payment system (PPS), designed mainly as a fixed price per discharge payment system, provides incentives to restrain inpatient care costs by encouraging hospitals to manage their services and costs efficiently. In this article I examine total hospital facility and Medicare inpatient PPS financial and utilization trends in hospitals that were under PPS continuously from the PPS 2 period (roughly 1985) through the PPS 7 period (roughly 1990) in order to determine the impact of PPS.

Also examined in this article are general trends in revenues, expenses, and net profits for different hospital sectors; factors determining cost increases in these sectors, including costs of input resources, real outputs of goods and services, and total factor productivity rates; and how hospitals cope, or do not cope, under the restraints imposed by limits in Medicare PPS revenue growth and rising costs.

Data on gross and net revenues, expenses, and net profits were derived from a longitudinally linked file of Medicare cost reports for 4,653 hospitals for all cost report years PPS 2 (1985) through PPS 7 (1990). Only those hospitals that were continuously under PPS during the entire period were selected. Discharge data from Medicare's billing system were added to obtain case weight and charge information, and, where possible, employee data from the American Hospital Association (AHA) Annual Survey were also added. Thus, omitted were PPS excluded hospitals, psychiatric hospitals, hospitals in States that had a waiver (i.e., providers in Maryland, Massachusetts, New Jersey, New York, and Puerto Rico), newly

established hospitals that joined PPS after PPS 2, and hospitals that terminated business before PPS 7. Hospital disclosures are discussed by Williams, Hadley, and Pettingill (1992).

Medicare cost-reporting periods do not coincide with either calendar year or Federal fiscal year periods. Therefore, the characterization of PPS 2 data as applicable to 1985 and PPS 7 data as applicable to 1990 is only approximate. PPS 2 data represent cost report periods that began on or after October 1, 1984, and before October 1, 1985. PPS 7 data represent cost report periods that began on or after October 1, 1989, and before October 1, 1990. In the analysis (Tables 4-9), the focus is on average annual rates of change during the PPS 2 through PPS 7 period to minimize the effects of mixing data from Medicare provider cost report years with data from the AHA Annual Survey years and other price and cost information for Federal fiscal years.

To clearly focus on key factors underlying financial trends, three categories of hospitals from the 4,653 hospitals were defined based on the hospitals' Medicare PPS inpatient profit status in PPS 2 and PPS 7 (Table 1):

- Category one hospitals (1,692) with Medicare PPS inpatient profits in PPS 2 and with Medicare PPS inpatient profits in PPS 7.
- Category two hospitals (2,242) with Medicare PPS inpatient profits in PPS 2 and Medicare PPS inpatient losses in PPS 7.
- Category three hospitals (518) with Medicare inpatient losses in PPS 2 and Medicare inpatient losses in PPS 7.

These three categories of hospitals accounted for over 99 percent of all revenues for hospitals in 1990. Data were included for 201 additional hospitals that reported Medicare PPS inpatient profits in PPS 7 and Medicare PPS inpatient losses in PPS 2 in the total but not as a separate category.

Revenues, expenses, and net profits

Fewer hospitals reported positive overall facility profits in PPS 7 than in PPS 2. Of the 4,653 hospitals, 72.4 percent reported overall facility profits in PPS 7, a decrease from 77.2 percent in PPS 2 but an increase from 67.4 percent in PPS 4. In the same period, the proportion of hospitals with Medicare PPS inpatient profits dropped steadily from 84.5 percent to 40.7 percent (Table 2).

Hospital net revenues increased more slowly than expenses for all categories of hospitals during the PPS 2 through PPS 7 period as net profit rates declined (Table 3). Generally, overall facility profit rates were higher in hospitals with positive Medicare PPS inpatient net profits. However, increasing net profits in the non-Medicare sectors helped hospitals with Medicare

Table 1

Number of hospitals in the total facility sector and the Medicare prospective payment system (PPS) inpatient sector, by profit status: 1985 and 1990

Medicare PPS sector	Medicare PPS sector total	Total facility sector			
		Net profits in 1990		Net losses in 1990	
		Net profits in 1985	Net losses in 1985	Net profits in 1985	Net losses in 1985
Total	4,653	2,745	626	848	434
Net profits in 1990					
Net profits in 1985	1,692	1,157	214	229	92
Net losses in 1985	201	47	96	18	40
Net losses in 1990					
Net profits in 1985	2,242	1,387	195	486	174
Net losses in 1985	518	154	121	115	128

SOURCE: Health Care Financing Administration: Data from the Medicare Cost Reports.

Table 2

Percent distribution of prospective payment system (PPS) hospitals, by total hospital facility profit status and by Medicare inpatient PPS profit status: PPS 2 (1985) through PPS 7 (1990)

Year and Medicare inpatient PPS profit status	Total facility profit status		
	Total	Net profits	Net losses
PPS 7			
Total	100.0	72.4	27.6
Net profits	40.7	32.5	8.1
Net losses	59.3	39.9	19.4
PPS 6			
Total	100.0	70.9	29.1
Net profits	46.8	37.0	9.8
Net losses	53.2	33.9	19.3
PPS 5			
Total	100.0	68.9	31.1
Net profits	54.9	43.5	11.4
Net losses	45.1	25.4	19.7
PPS 4			
Total	100.0	67.4	32.6
Net profits	62.5	47.9	14.5
Net losses	37.5	19.4	18.1
PPS 3			
Total	100.0	69.2	30.8
Net profits	70.4	55.3	15.2
Net losses	29.6	13.9	15.6
PPS 2			
Total	100.0	77.2	22.8
Net profits	84.5	70.0	14.5
Net losses	15.5	7.2	8.3

¹This table represents 4,653 hospitals continuously under the prospective payment system (PPS) for the entire period PPS 2 (1985) through PPS 7 (1990). Data are excluded for providers in the States of Maryland, Massachusetts, New Jersey, and New York.

NOTE: For definition of PPS 2 through PPS 7, see "Introduction."

SOURCE: Health Care Financing Administration: Data from the Medicare Cost Reports.

PPS inpatient sector losses to maintain levels of net profit comparable to those reported by hospitals in the pre-PPS period. Trends by type of Medicare PPS inpatient profit status differed:

- Category one hospitals reported higher rates of increase in Medicare PPS revenues than category two hospitals.
- Category two hospitals reported higher rates of increase in Medicare PPS expenses than the other two categories.
- Category three hospitals reported relatively high rates of increase in Medicare PPS revenues and relatively low rates of increase in Medicare PPS expenses, but neither trend was sufficient to provide them with Medicare PPS profits during the period. These hospitals began their PPS experience with losses when most hospitals were reporting substantial profits under PPS. Their subsequent performance under PPS indicates that, despite relatively rapid increases in their Medicare PPS revenues and their relatively effective restraints on costs, these hospitals have never been able to register profits under PPS.

Determinants of trends in expenses

Hospital expenses are defined by the accounting identity:

$$\begin{aligned} \text{Expenses} &= (\text{real outputs}) \times (\text{expenses/inputs}) \\ &\times (\text{inputs/real outputs}) \\ &= (\text{real outputs}) \\ &\times (\text{expenses/inputs}/(\text{productivity rate})) \end{aligned}$$

where

real outputs are defined as all patient care goods and services that appear on bills submitted to patients by hospitals; (expenses/inputs), sometimes called the hospital input price index, is defined as average costs per unit of resource input (including labor, capital, and other material input resources); productivity is defined as the ratio of real outputs to all factors of production. This measure of productivity is, therefore, called a "total factor" productivity measure.

Table 3

Amounts and percent change per prospective payment system (PPS) hospital of net revenues, expenses, and net profits, by selected sectors: PPS 2 (1985) to PPS 7 (1990)

Sector and year	All hospitals					
	Net revenue		Expenses		Net profits	
	Amount	Percent change	Amount	Percent change	Amount	Percent of net revenues
Total facility sector						
PPS 7	\$37,179,114	11.1	\$35,391,385	11.4	\$1,787,729	4.8
PPS 6	33,463,355	11.4	31,765,269	11.4	1,698,086	5.1
PPS 5	30,045,806	10.3	28,519,025	9.9	1,526,780	5.1
PPS 4	27,249,459	7.2	25,940,909	8.5	1,308,550	4.8
PPS 3	25,424,958	6.0	23,902,236	7.9	1,522,722	6.0
PPS 2	23,996,156	—	22,154,732	—	1,841,424	7.7
Medicare inpatient sector						
PPS 7	9,962,298	7.3	10,225,399	10.2	(363,101)	-3.7
PPS 6	9,194,016	8.5	9,282,036	12.2	(88,045)	-1.0
PPS 5	8,470,643	5.9	8,269,487	9.3	200,950	2.4
PPS 4	7,995,699	3.1	7,562,433	6.8	433,176	5.4
PPS 3	7,752,492	0.5	7,079,771	6.0	672,736	8.7
PPS 2	7,712,871	—	6,677,558	—	1,035,266	13.4
Medicare outpatient sector						
PPS 7	1,467,567	18.1	1,467,567	18.1	0	0.0
PPS 6	1,242,323	18.7	1,242,323	18.7	0	0.0
PPS 5	1,046,972	18.8	1,046,972	18.8	0	0.0
PPS 4	880,947	18.1	880,947	18.1	0	0.0
PPS 3	745,954	19.8	745,954	19.8	0	0.0
PPS 2	622,760	—	622,760	—	0	0.0
Non-Medicare sector						
PPS 7	25,849,248	12.3	23,698,419	11.6	2,150,829	8.3
PPS 6	23,026,832	12.2	21,240,701	10.6	1,786,132	7.8
PPS 5	20,526,071	11.7	19,200,241	9.7	1,325,830	6.5
PPS 4	18,371,469	8.5	17,496,094	8.8	875,375	4.8
PPS 3	16,926,985	8.1	16,076,999	8.2	849,987	5.0
PPS 2	15,662,136	—	14,855,978	—	806,157	5.1
Total facility sector						
Category 1: Hospitals with Medicare PPS profits in PPS 2 and PPS 7						
PPS 7	\$40,601,678	12.2	\$38,446,647	11.4	\$2,155,031	5.3
PPS 6	36,184,996	11.1	34,505,854	11.2	1,679,142	4.6
PPS 5	32,559,158	8.9	31,033,043	8.9	1,526,115	4.7
PPS 4	29,904,738	6.8	28,489,201	8.4	1,415,537	4.7
PPS 3	28,008,884	6.1	26,285,076	8.1	1,723,808	6.2
PPS 2	26,403,697	—	24,323,092	—	2,080,605	7.9
Medicare inpatient sector						
PPS 7	10,964,331	9.1	10,110,782	9.6	853,549	7.8
PPS 6	10,047,130	8.8	9,226,239	11.5	823,665	8.2
PPS 5	9,236,628	6.4	8,270,011	7.2	967,475	10.5
PPS 4	8,680,254	4.5	7,711,238	6.6	969,499	11.2
PPS 3	8,306,625	0.3	7,238,326	5.4	1,068,742	12.9
PPS 2	8,284,154	—	6,863,179	—	1,421,457	17.2
Medicare outpatient sector						
PPS 7	1,485,304	14.7	1,485,304	14.7	0	0.0
PPS 6	1,294,411	17.8	1,294,411	17.8	0	0.0
PPS 5	1,099,135	17.3	1,099,135	17.3	0	0.0
PPS 4	936,699	15.6	936,699	15.6	0	0.0
PPS 3	810,547	18.0	810,547	18.0	0	0.0
PPS 2	687,036	—	687,036	—	0	0.0

See footnotes at end of table.

Table 3—Continued

Amounts and percent change per prospective payment system (PPS) hospital of net revenues, expenses, and net profits, by selected sectors: PPS 2 (1985) to PPS 7 (1990)

Sector and year	Category 1: Hospitals with Medicare PPS profits in PPS 2 and PPS 7					
	Net revenue		Expenses		Net profits	
	Amount	Percent change	Amount	Percent change	Amount	Percent of net revenues
Non-Medicare sector						
PPS 7	\$28,152,043	13.3	\$26,850,561	11.9	\$1,301,482	4.6
PPS 6	24,842,958	11.8	23,987,481	10.7	855,477	3.4
PPS 5	22,223,066	9.5	21,664,426	9.2	558,640	2.5
PPS 4	20,285,796	7.4	19,839,758	8.8	446,038	2.2
PPS 3	18,892,683	8.4	18,237,617	8.7	655,067	3.5
PPS 2	17,431,999	—	16,772,851	—	659,148	3.8
Total facility sector						
Category 2: Hospitals with Medicare profits in PPS 2 and Medicare losses in PPS 7						
PPS 7	\$42,083,878	10.9	\$40,149,380	11.6	\$1,934,498	4.6
PPS 6	37,955,848	11.0	35,974,543	11.5	1,981,305	5.2
PPS 5	34,209,623	11.2	32,277,427	10.7	1,932,196	5.6
PPS 4	30,756,541	6.9	29,148,217	8.3	1,608,324	5.2
PPS 3	28,764,265	6.1	28,924,706	8.2	1,839,559	6.4
PPS 2	27,103,530	—	24,882,273	—	2,221,257	8.2
Medicare inpatient sector						
PPS 7	11,065,213	6.0	12,335,017	10.8	(1,269,804)	-11.5
PPS 6	10,435,140	8.2	11,133,088	12.7	(697,704)	-6.7
PPS 5	9,647,336	5.4	9,885,855	10.7	(238,153)	-2.5
PPS 4	9,154,854	1.9	8,924,004	6.9	231,635	2.5
PPS 3	8,985,417	0.9	8,350,380	7.3	636,189	7.1
PPS 2	8,906,100	—	7,782,959	—	1,123,693	12.6
Medicare outpatient sector						
PPS 7	1,707,682	20.3	1,707,682	20.3	0	0.0
PPS 6	1,419,108	19.5	1,419,108	19.5	0	0.0
PPS 5	1,187,901	19.7	1,187,901	19.7	0	0.0
PPS 4	992,357	18.6	992,357	18.6	0	0.0
PPS 3	836,909	21.0	836,909	21.0	0	0.0
PPS 2	691,936	—	691,936	—	0	0.0
Non-Medicare sector						
PPS 7	29,310,983	12.3	26,106,681	11.5	3,204,302	10.9
PPS 6	26,098,634	11.6	23,419,626	10.4	2,679,009	10.3
PPS 5	23,376,142	13.4	21,205,793	10.3	2,170,349	9.3
PPS 4	20,606,818	8.8	19,230,128	8.4	1,376,689	6.7
PPS 3	18,940,968	8.2	17,737,598	8.1	1,203,371	6.4
PPS 2	17,506,788	—	16,409,224	—	1,097,564	6.3

See footnotes at end of table.

Real output trends

Medicare PPS inpatient real outputs, as measured in PPS 2 (1985) constant gross revenue dollars, increased at about the same rate for category one hospitals and for category two hospitals. Non-Medicare sector real output growth was slowest for category one hospitals and fastest for category two hospitals (Table 4). Medicare outpatient sector real outputs increased very rapidly for all hospital sectors during the study period but was highest in the category three hospitals.

Hospital input price index

Expenses per unit of input resource vary with labor compensation costs, capital costs, and other material costs. I have assumed that differences in changes in the cost of input resources by hospital category are attributable to changes in average labor compensation costs (i.e., average payroll costs and average benefit costs per full-time equivalent worker [FTE]). Therefore, it was assumed also that changes in unit costs for non-labor input resources (i.e., capital and other non-capital input resources) were the same as the

Table 3—Continued

Amounts and percent change per prospective payment system (PPS) hospital of net revenues, expenses, and net profits, by selected sectors: PPS 2 (1985) to PPS 7 (1990)

Sector and year	Category 3: Hospitals with Medicare PPS losses in PPS 2 and Medicare PPS losses in PPS 7					
	Net revenue		Expenses		Net profits	
	Amount	Percent change	Amount	Percent change	Amount	Percent of net revenues
Total facility sector						
PPS 7	\$15,875,920	8.0	\$15,425,531	8.6	\$450,389	2.8
PPS 6	14,699,554	12.6	14,206,213	10.7	493,341	3.4
PPS 5	13,059,338	11.2	12,837,986	9.8	221,352	1.7
PPS 4	11,739,539	11.0	11,693,635	11.7	45,904	0.4
PPS 3	10,573,056	5.2	10,464,769	5.3	108,287	1.0
PPS 2	10,051,234	—	9,936,150	—	115,084	1.1
Medicare inpatient sector						
PPS 7	4,008,221	5.0	4,670,542	8.0	(662,321)	-16.5
PPS 6	3,817,494	9.5	4,326,550	12.4	(509,056)	-13.3
PPS 5	3,487,084	9.0	3,847,919	10.8	(360,835)	-10.3
PPS 4	3,199,367	5.5	3,472,045	8.0	(272,678)	-8.5
PPS 3	3,031,520	-0.6	3,214,732	0.2	(183,211)	-6.0
PPS 2	3,048,451	—	3,207,956	—	(159,505)	-5.2
Medicare outpatient sector						
PPS 7	763,666	16.8	763,666	16.8	0	0.0
PPS 6	653,778	18.0	653,778	18.0	0	0.0
PPS 5	554,283	20.8	554,283	20.8	0	0.0
PPS 4	458,911	27.8	458,911	27.8	0	0.0
PPS 3	359,072	23.9	359,072	23.9	0	0.0
PPS 2	289,757	—	289,757	—	0	0.0
Non-Medicare sector						
PPS 7	11,104,033	8.6	9,991,323	8.3	1,112,710	10.0
PPS 6	10,228,282	13.4	9,225,884	9.4	1,002,398	9.8
PPS 5	9,017,971	11.6	9,435,784	8.7	582,187	6.5
PPS 4	8,081,261	12.5	7,762,679	12.7	318,582	3.9
PPS 3	7,182,464	7.0	6,890,965	7.0	291,499	4.1
PPS 2	6,713,026	—	6,438,437	—	274,589	4.1

NOTE: For definition of PPS 2 through PPS 7, see "Introduction."

SOURCE: Health Care Financing Administration: Data from the Medicare Cost Reports.

national rate of change for all categories of hospitals. A hospital input price index, which the Health Care Financing Administration (HCFA) routinely prepares for the Bureau of Economic Analysis (BEA), U.S. Department of Commerce, was used to represent changes in non-compensation unit costs (the BEA Index).

Average annual salaries and benefits per FTE worker increased fastest in category two hospitals (Table 5). Category three hospitals reported the lowest levels of salaries and benefits and the lowest increases in compensation.

Combining rates of change in compensation with national rates of change in other input resource unit costs (using weights from the BEA Index) yields an overall index of change in input prices (Table 6). Changes in this combined input price index by category of hospital thus represent a measure of variation in input prices by category of hospital where sources of variation are solely the result of compensation differences.

Productivity rates

The rates of change in total factor productivity are derived as a residual amount from the preceding definition of expenses. Total factor productivity is defined as the ratio of all hospital outputs to all units of factor inputs, including labor, capital, and materials. Because changes in expenses, real outputs, and input prices can be estimated, total factor productivity rate changes are determined as a residual amount from the accounting identity (Table 7).

Sources of expenses by hospital category

Hospital expenses change by type of Medicare PPS inpatient profit status and by type of facilities sector. Because it is assumed that changes in the hospital input price index are the same by type of facilities sector (but not by type of Medicare PPS inpatient profit status), sources of increase in expenses by facilities sector derive

Table 4

Constant (1985) dollar value of real outputs, by type of facility sector and by hospital Medicare prospective payment system (PPS) profit status: PPS 2 and PPS 7¹

Type of facility sector and year	Total facility sector	Medicare PPS inpatient sector	Medicare outpatient sector	Non-Medicare sector
All hospitals				
PPS 7 current dollar amount	\$55,222,315	\$17,374,500	\$2,730,527	\$35,117,288
PPS 2 current dollar amount	27,902,375	9,855,864	892,812	17,153,699
PPS 7 constant dollar amount	36,467,288	11,481,220	1,796,763	23,190,305
PPS 2 constant dollar amount	27,902,375	9,855,864	892,812	17,153,699
Average annual percent change PPS 2 to PPS 7 (constant dollar)	5.5	3.1	15.0	6.2
Hospitals with Medicare PPS profits in PPS 2 and PPS 7				
PPS 7 current dollar amount	59,834,963	17,447,164	2,717,880	39,669,919
PPS 2 current dollar amount	30,861,718	9,934,936	958,007	19,968,775
PPS 7 constant dollar amount	39,576,162	11,573,332	1,788,621	26,214,209
PPS 2 constant dollar amount	30,861,718	9,934,936	958,007	19,968,775
Average annual percent change PPS 2 to PPS 7 (constant dollar)	5.1	3.1	13.3	5.6
Hospitals with Medicare PPS profits in PPS 2 and Medicare PPS losses in PPS 7				
PPS 7 current dollar amount	62,986,630	20,822,274	3,222,944	38,941,412
PPS 2 current dollar amount	31,346,795	11,772,152	1,014,118	18,560,526
PPS 7 constant dollar amount	41,751,583	13,780,163	2,120,828	25,850,592
PPS 2 constant dollar amount	31,346,795	11,772,152	1,014,118	18,560,526
Average annual percent change PPS 2 to PPS 7 (constant dollar)	5.9	3.2	15.9	6.9
Hospitals with Medicare PPS losses in PPS 2 and in PPS 7				
PPS 7 current dollar amount	23,420,657	7,661,580	1,385,873	14,373,204
PPS 2 current dollar amount	11,826,842	4,252,632	412,785	7,161,425
PPS 7 constant dollar amount	15,457,209	5,050,793	912,770	9,493,646
PPS 2 constant dollar amount	11,826,842	4,252,632	412,785	7,161,425
Average annual percent change PPS 2 to PPS 7 (constant dollar)	5.5	3.5	17.2	5.8

¹Constant dollar value cited in 1985 (roughly PPS 2) dollars.

NOTE: For definition of PPS 2 and PPS 7, see "Introduction."

SOURCES: Health Care Financing Administration: Medicare Cost Reports and Bureau of Labor Statistics: Consumer Price Index Hospital List Prices.

from increases in real outputs and/or from decreases in total factor productivity rates. In this section, I provide an hypothesis on changes in key determinants of hospital expenses by category of Medicare inpatient PPS profit status and by sector within the hospital.

In the Medicare PPS inpatient sector, expenses rose more rapidly in the category two hospitals than in the category one hospitals primarily because of larger declines in productivity rates and higher input prices (Table 7). By contrast, expenses for category two hospitals rose more slowly than for the category one hospitals in the non-Medicare sector because productivity rates there were substantially higher (Figure 1). This apparently anomalous productivity performance in category two hospitals may be the result of cost-shifting from the non-Medicare sector to the Medicare inpatient PPS sector.

Cost-shifting to the Medicare inpatient PPS sector occurs when cost reports by hospitals to the Medicare program allocate resources to the Medicare inpatient

sector that were actually used in the non-Medicare sector. Ashby (1992) compared Medicare inpatient costs derived from Medicare cost reports with costs derived from advanced hospital accounting systems. This analysis found that the Medicare cost reports overstated Medicare inpatient routine and special-care unit costs by 12.6 percent and understated Medicare inpatient ancillary costs by 4.9 percent. Total Medicare inpatient costs were overstated 4.4 percent.

In a parallel study (Center for Health Policy Studies, 1990), outpatient costs were found to be overstated, a finding that confirms Ashby's (1992) conclusion that Medicare inpatient ancillary costs are understated. These studies show that the Medicare inpatient expenses for the inpatient and outpatient sectors may be understated and, therefore, the net profits (losses) may be larger (smaller) than the amounts shown.

Table 5

Total compensation, wages and salaries, and benefits per full-time equivalent employees, by Medicare profit status: PPS 2 (1985) and PPS 7 (1990)

Sector and year	Total compensation	Wages and salaries	Benefits
All hospitals			
PPS 7	\$30,845	\$25,761	\$5,084
PPS 2	23,603	19,851	3,751
Average annual percent change	5.5	5.4	6.3
Hospitals with Medicare PPS profits in PPS 2 and PPS 7			
PPS 7	\$30,932	\$25,908	\$5,023
PPS 2	23,842	20,073	3,769
Average annual percent change	5.3	5.2	5.9
Hospitals with Medicare PPS profits in PPS 2 and Medicare PPS losses in PPS 7			
PPS 7	\$31,107	\$25,944	\$5,163
PPS 2	23,577	19,814	3,763
Average annual percent change	5.7	5.5	6.5
Hospitals with Medicare PPS losses in PPS 2 and in PPS 7			
PPS 7	\$28,883	\$23,928	\$4,955
PPS 2	22,581	19,008	3,573
Average annual percent change	5.0	4.7	6.8

NOTES: PPS is prospective payment system. For definition of PPS 2 and PPS 7, see "Introduction."

SOURCE: Health Care Financing Administration and American Hospital Association: Linked Medicare Cost Report and annual survey files.

The basic reason for the overall decline in Medicare PPS inpatient profits is the rapid increase in costs per unit of output compared with slower increases in output transaction prices (output transaction prices are defined as net revenues divided by real outputs as shown in Table 8). Changes in output transaction prices exceeded changes in costs per output in the non-Medicare sector thus offsetting losses in the Medicare sector and maintaining overall facility net profit rates.

Industry and general economy growth

Medicare PPS inpatient sector expenditures for the hospitals in this study grew less rapidly than GDP during the study period, despite a more rapid increase in real outputs, because changes in output transaction prices for this sector were kept well below general economy price increases (Table 9). By contrast, both real outputs and output transaction prices in all other hospital sectors rose more rapidly, thus causing a rate of growth in total hospital expenditures that exceeded general economic growth (Figure 2).

Table 6

Average annual percent change in input price index, by prospective payment system (PPS) hospital profit status: PPS 2 (1985) and PPS 7 (1990)

Profit status	Total	Compensation	Non-compensation ¹
All hospitals	5.0	5.5	4.2
Category 1 ²	4.9	5.3	4.2
Category 2 ³	5.1	5.7	4.2
Category 3 ⁴	4.7	5.0	4.2

¹Non-compensation component of hospital input price indexes prepared by the Health Care Financing Administration for the Bureau of Economic Analysis, U.S. Department of Commerce.

²Hospitals with Medicare PPS net profits in PPS 2 and PPS 7.

³Hospitals with Medicare PPS net profits in PPS 2 and net losses in PPS 7.

⁴Hospitals with Medicare PPS net losses in PPS 2 and PPS 7.

NOTE: For definition of PPS 2 and PPS 7, see "Introduction."

SOURCE: Health Care Financing Administration: Linked Medicare Cost Reports, and annual surveys; American Hospital Association (AHA): The AHA Survey payroll, benefit, and full-time-equivalent worker data.

Table 7

Average annual ratio changes in expenses and expense determinants, by type of facility sector and type of Medicare inpatient prospective payment system (PPS) profit status: PPS 2 (1985) and PPS 7 (1990)¹

Sector and PPS inpatient profit status	Average annual changes in:			
	Expenses	= Real outputs	× Input price index	Productivity rate
Total facility sector				
All hospitals	1.098	1.055	1.050	1.009
Category 1 ²	1.096	1.051	1.049	1.006
Category 2 ³	1.100	1.059	1.051	1.012
Category 3 ⁴	1.092	1.055	1.047	1.011
Medicare inpatient PPS sector				
All hospitals	1.089	1.031	1.050	0.994
Category 1 ²	1.081	1.031	1.049	1.000
Category 2 ³	1.096	1.032	1.051	0.990
Category 3 ⁴	1.078	1.035	1.047	1.005
Medicare outpatient hospital sector				
All hospitals	1.187	1.150	1.050	1.017
Category 1 ²	1.167	1.133	1.049	1.018
Category 2 ³	1.198	1.159	1.051	1.107
Category 3 ⁴	1.214	1.172	1.047	1.011
Non-Medicare sector				
All hospitals	1.098	1.062	1.050	1.015
Category 1 ²	1.099	1.058	1.049	1.010
Category 2 ³	1.097	1.069	1.051	1.024
Category 3 ⁴	1.092	1.058	1.047	1.014

¹Expenses are defined by the identity: Expenses equal real outputs multiplied by input prices divided by total factor productivity rates.

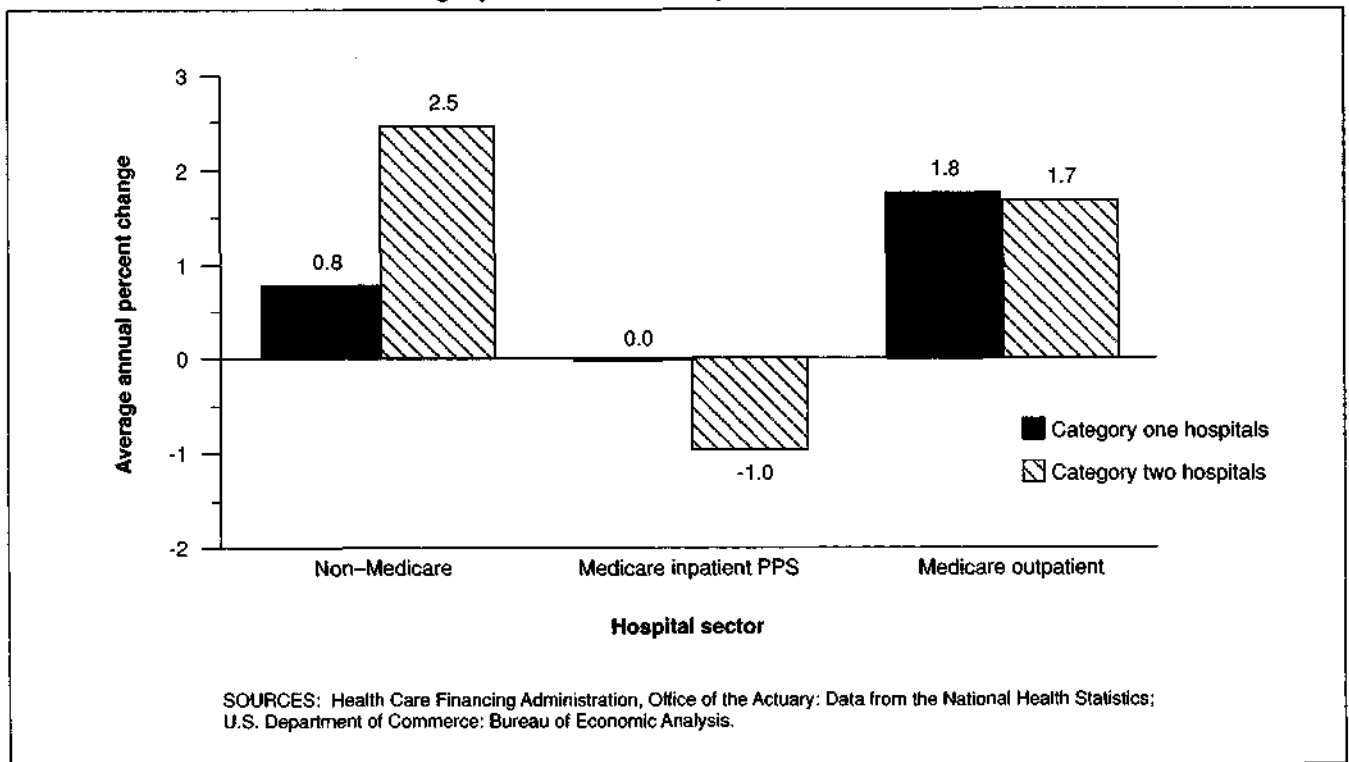
²Hospitals with Medicare PPS net profits in PPS 2 and PPS 7.

³Hospitals with Medicare PPS net profits in PPS 2 and net losses in PPS 7.

⁴Hospitals with Medicare PPS net losses in PPS 2 and PPS 7.

SOURCE: Health Care Financing Administration: Office of the Actuary.

Figure 1
Percent changes in productivity rates, by selected hospital prospective payment system (PPS) profit category and selected hospital sector: 1985-90



Medicare revenues and expenses per discharge

Although the number of Medicare discharges per hospital changed minimally during the study period, revenues per discharge and the distribution of revenues per discharge by type of revenue source changed markedly by Medicare PPS inpatient profit status as shown by comparisons between category one hospitals and category two hospitals (Table 10). Category one hospitals reported:

- More rapid increases in diagnosis-related group (DRG) payments (the prospective payments portion of inpatient Medicare revenues). DRG payments per discharge increased 3.8 percent annually compared with 3.1 percent annually for the category two hospitals.
- Larger increases in revenues other than DRG payments, particularly direct and indirect medical education amounts and disproportionate share amounts. Between PPS 2 and PPS 7, DRG payments declined from 83 percent to 76 percent of total Medicare revenues for category one hospitals as payments from non-DRG sources increased. Although category two hospitals also received relatively more revenues from non-DRG sources, the amounts were substantially less per discharge.

As previously discussed, Medicare PPS inpatient expenses for category one hospitals rose more slowly than expenses for category two hospitals. In PPS 2, expenses per discharge were \$76 higher in the category two hospitals, a difference that grew to \$574 by PPS 7,

an additional \$498 per discharge (Table 11). It is estimated that about three-fifths of this additional expense was because of relative declines in total factor productivity rates in the category two hospitals. If the cost increases in the category two hospitals had been the same as category one hospitals, then category two hospitals' average net loss per discharge would have been \$159 (2.9 percent of net revenues) instead of \$622 (11.5 percent of net revenues) in PPS 7. If category one hospitals had incurred the same average expenses as the category two hospitals, their net Medicare PPS profits would have averaged \$8 per discharge (0.1 percent of net revenues) instead of \$442 (7.5 percent of net revenues) observed in PPS 7.

Two alternative hypotheses about the differences in Medicare PPS inpatient expense increases between the category one hospitals and the category two hospitals are:

- That the category one hospitals better restrained increases in expenses by maintaining higher rates of increase in productivity.
- That apparently higher expenses in category two hospitals are not real because expenses have been shifted into the Medicare PPS inpatient sector that were actually incurred in the non-Medicare sector.

At this time, evidence is insufficient to determine which hypothesis is more valid.

Table 8

Average annual percent changes in expenses per real output and output transaction prices, by category of Medicare prospective payment system (PPS) inpatient profit status: PPS 2 (1985) and PPS 7 (1990)

Sector and profit status	Average annual percent changes in:	
	Expenses per unit of output	Output transaction prices
Total facility sector		
All hospitals	4.1	3.4
Category 1 ¹	4.3	3.7
Category 2 ²	3.9	3.1
Category 3 ³	3.5	3.9
Medicare inpatient PPS sector		
All hospitals	5.6	1.9
Category 1 ¹	4.8	2.6
Category 2 ²	6.2	1.2
Category 3 ³	4.2	2.1
Medicare outpatient hospital sector		
All hospitals	3.2	3.2
Category 1 ¹	3.0	3.0
Category 2 ²	3.4	3.4
Category 3 ³	3.6	3.6
Non-Medicare sector		
All hospitals	3.4	4.1
Category 1 ¹	3.9	4.3
Category 2 ²	2.6	3.7
Category 3 ³	3.2	4.5

¹Hospitals with Medicare PPS net profits in PPS 2 and PPS 7.

²Hospitals with Medicare PPS net profits in PPS 2 and net losses in PPS 7.

³Hospitals with Medicare PPS net losses in PPS 2 and PPS 7.

NOTE: For definition of PPS 2 and PPS 7, see "Introduction."

SOURCE: Health Care Financing Administration: Office of the Actuary.

Case mix by hospital category

Case-mix indexes are used in the industry to represent average case complexity in PPS. Some argue that rapidly increasing outputs per discharge and lower productivity rates in category two hospitals are the result of more complex cases, i.e., higher case-mix indexes, that require more goods and services and greater amounts of labor and non-labor resources. However, case-mix index changes in category two hospitals are the same as for the other two hospital categories (Table 12).

Data sources and limitations

About 5,100 hospitals were continuously under PPS during the study period PPS 2 through PPS 7. Total facility and/or Medicare revenue and expense data for one or more cost reports for some of these hospitals were clearly erroneous (resulting in profit or loss rates that exceeded 100 percent in some cases). After eliminating hospitals that clearly reported erroneous data, 4,653 hospitals were accepted.

Data shown for Medicare outpatient activity includes only that portion of outpatient care that is currently

Table 9

Average annual percent changes in nominal amounts, real amounts, and output prices for gross domestic product, total hospital facility revenues, Medicare inpatient prospective payment system (PPS) revenues, and all other hospital facility revenues: PPS 2 (1985) and PPS 7 (1990)

Item	Nominal amount	Real amount	Output transaction price
Gross domestic product	6.4	2.7	3.6
Total hospital facility revenues	9.2	5.5	3.4
Medicare inpatient PPS revenues	5.0	3.1	1.8
All other hospital facility revenues	10.9	6.4	4.2

NOTE: For definition of PPS 2 and PPS 7, see "Introduction."

SOURCES: Gross domestic product nominal and price changes were obtained from the Economic Report to the President, 1992. Hospital revenue and price data were derived by the Health Care Financing Administration.

paid on a reasonable-cost basis and excludes aspects of Medicare outpatient care that is paid on a fee schedule. These fee-schedule revenues and expenses were not included in the Medicare sections of the Medicare cost reports and thus could not be captured. Such fee-schedule amounts, therefore, are erroneously included in the non-Medicare categories, along with other minor Medicare amounts for hospital-based skilled nursing and home health agency care. It is estimated that outpatient fee-schedule payments comprised about 10 to 15 percent of the amounts shown for outpatient reasonable costs in recent years.

Data for Medicare-related managed-care revenues and expenses are not identified in Medicare cost reports and, therefore, are implicitly part of the non-Medicare sector.

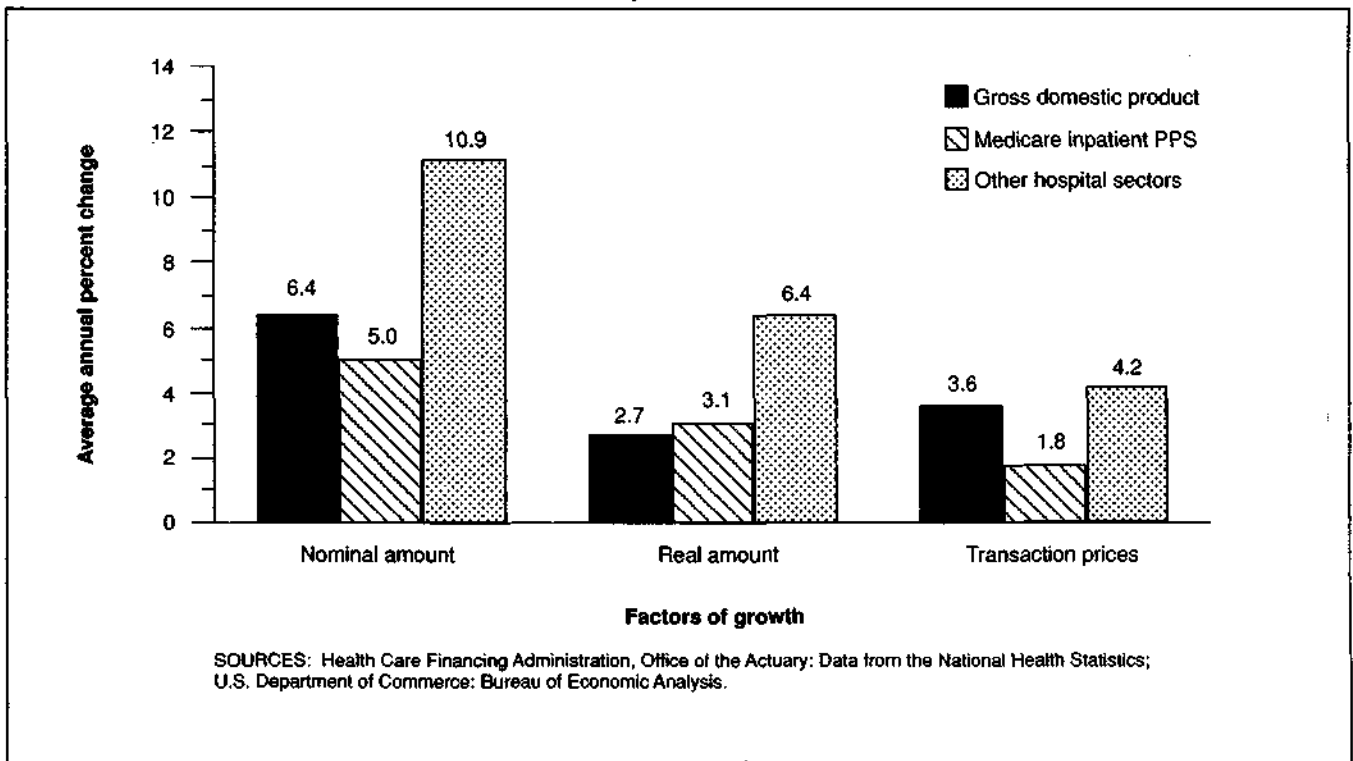
Data for Medicare-related inpatient revenues and expenses are implicitly a part of the non-Medicare sector where Medicare has no liability because employer-sponsored private health insurance paid the entire amount due for an employed Medicare enrollee who was dually entitled to Medicare hospital insurance and private health insurance.

Data from the Medicare cost report file were linked with the AHA Annual Survey files for the study period PPS 2 through PPS 7 to obtain data on average payroll costs, benefits, and numbers of FTEs by hospital. A 96-percent crosswalk between the two data sets provided sufficient information to reasonably estimate the compensation and employment history of the subsets of hospitals examined.

Annual files of Medicare discharge bills provide information on case weights under the PPS DRG system by individual hospital. These annual files, called "case-mix index files," were merged with the Medicare cost reports to provide trends in case-mix indexes by categories of hospitals.

Data on constant dollar values of real outputs provided by categories of hospitals were based on procedures as described by Fisher (1992). For estimates

Figure 2
Factors of growth for gross domestic product, Medicare inpatient prospective payment system (PPS), and other hospital sectors: 1985-90



of the constant dollar values, percent changes in gross revenues per hospital for the total facilities sector, the Medicare PPS inpatient sector, and the non-Medicare sector by Federal fiscal year were deflated by percent changes in the Consumer Price Index (CPI) component for hospital and related services. Gross Medicare outpatient revenues per hospital were deflated by the CPI component (hospital and related services) excluding the effects of hospital room index changes.

Because room-related gross revenues are available from Medicare cost reports for the total facility sector, but not for the Medicare inpatient sector, a ratio of total Medicare inpatient gross revenues to Medicare inpatient ancillary gross revenues for each hospital for each Federal fiscal year was obtained from individual PPS discharge bills on annual HCFA Medicare provider analysis and review (MEDPAR) files. This ratio was linked to each hospital's cost report file in this study with the corresponding PPS year. The ratio of room-related gross revenues to inpatient ancillary gross revenues from the MEDPAR files by the inpatient ancillary gross revenues in the cost reports thus provided an estimate of room-related Medicare gross revenues consistent with Medicare cost reports. Gross revenues for the non-Medicare sector were obtained by subtracting the Medicare PPS inpatient data and the Medicare outpatient data from the total facility data.

Therefore, all average hospital list prices (i.e., prices for individual goods and services before any discounts are applied) by category of hospital and by category of

facility within hospitals changed at the same rate as the relevant portion of the CPI hospital index.

The values for determinants of increases (Table 7) can be evaluated from one's assessment of the robustness of the data used to establish each component of the accounting identity incorporated. If the annual rates of increase in total expenses and in the hospital input price index are relatively robust, then relative changes in real resource inputs are robust because real inputs are defined as total expenses divided by the hospital input price index. The expense accounting identity is defined as follows:

$$\text{Expense} = (\text{real outputs}) \times (\text{inputs/real outputs}) \times (\text{expenses/inputs})$$

can then be restated as the input accounting identity

$$\text{Inputs} = (\text{real outputs}) \times (\text{inputs/real outputs}).$$

Because measurements of inputs are relatively robust, the validity of the findings about changes in real outputs and productivity rates thus depend on the validity of the method to derive real outputs. The validity of the method to derive real outputs, in turn, depends on the validity of the assumption that the CPI Hospital and Related Index is a list price measurement rather than a transaction price measurement.

If the CPI Hospital and Related Index is not an adequate measure of hospital list prices, then the expense accounting identity may still be useful because

Table 10

Medicare prospective payment system (PPS) inpatient discharges, payments per discharge, and percent distribution of payments, by type of payment and by Medicare inpatient PPS profit status: PPS 2 and PPS 7

Profit status and year	Number of discharges per hospital	Total		DRG payment		Payments per discharge					
		Amount	Annual percent change	Amount	Annual Percent change	Outlier payment	Capital pass-through	Direct medical Education Amount	Indirect Medical Education Amount	Disproportionate Share Amount	Other amount ¹
All hospitals											
PPS 7	1,782	\$4,534	4.9	\$4,365	3.5	\$163	\$507	\$112	\$221	\$152	\$14
PPS 2	1,772	4,362	—	3,679	—	57	383	88	122	2	21
PPS 7	—	100.0	—	78.9	—	Percent distribution	9.2	2.0	4.0	2.8	0.2
PPS 2	—	100.0	—	84.5	—	1.3	8.8	2.0	2.8	0.0	0.5
Hospitals with Medicare PPS profits in PPS 2 and PPS 7											
PPS 7	1,849	5,929	5.6	4,525	3.8	146	457	167	354	258	22
PPS 2	1,832	4,522	—	3,755	—	58	356	133	197	3	21
PPS 7	—	100.0	—	76.3	—	Percent distribution	7.7	2.8	6.0	4.4	0.4
PPS 2	—	100.0	—	83.0	—	1.3	7.9	2.9	4.4	0.1	0.5
Hospitals with Medicare PPS profits in PPS 2 and Medicare PPS losses in PPS 7											
PPS 7	2,042	5,419	4.4	4,356	3.1	182	452	85	156	89	10
PPS 2	2,036	4,373	—	3,739	—	59	400	66	85	1	23
PPS 7	—	100.0	—	80.4	—	Percent distribution	10.0	1.6	2.9	1.6	0.2
PPS 2	—	100.0	—	85.5	—	1.4	9.1	1.5	1.9	0.0	0.5
Hospitals with Medicare PPS losses in PPS 2 and in PPS 7											
PPS 7	894	4,484	5.5	3,676	4.7	130	553	24	32	71	(2)
PPS 2	888	3,433	—	2,926	—	47	415	16	16	0	10
PPS 7	—	100.0	—	82.0	—	Percent distribution	12.3	0.5	0.7	1.6	-0.1
PPS 2	—	100.0	—	85.2	—	1.4	12.1	0.5	0.5	0.0	0.3

¹Includes kidney acquisition pass-through costs, high end stage renal disease use amounts, returns to equity, and sequestration offsets.

NOTES: DRG is diagnosis-related group. For definition of PPS 2 and PPS 7, see "Introduction."

SOURCE: Health Care Financing Administration: Medicare Cost Reports.

Table 11

Medicare prospective payment system (PPS) inpatient discharges, expenses per discharge, and percent distribution of expenses, by type of expense and by Medicare Inpatient PPS profit status: PPS 2 (1985) and PPS 7 (1990)

Profit status and year	Total cost		Operating costs	Capital-related expenses	Direct medical education expenses	Kidney acquisition cost pass-through	Malpractice expense
	Amount	Annual percent change					
All hospitals							
				Dollar amount per discharge			
PPS 7	\$5,738	8.8	\$4,979	\$589	\$128	\$18	\$25
PPS 2	3,767	—	3,267	383	88	9	21
				Percent distribution			
PPS 7	100.0	—	86.8	10.3	2.2	0.3	0.4
PPS 2	100.0	—	86.7	10.2	2.3	0.2	0.5
Hospitals with Medicare PPS profits in PPS 2 and PPS 7							
				Dollar amount per discharge			
PPS 7	5,467	7.9	4,693	531	194	25	24
PPS 2	3,746	—	3,225	356	133	14	19
				Percent distribution			
PPS 7	100.0	—	85.8	9.7	3.6	0.5	0.4
PPS 2	100.0	—	86.1	9.5	3.5	0.4	0.5
Hospitals with Medicare PPS profits in PPS 2 and Medicare PPS losses in PPS 7							
				Dollar amount per discharge			
PPS 7	6,041	9.6	5,276	630	94	15	26
PPS 2	3,822	—	3,328	400	66	6	21
				Percent distribution			
PPS 7	100.0	—	87.3	10.4	1.6	0.2	0.4
PPS 2	100.0	—	87.1	10.5	1.7	0.2	0.6
Hospitals with Medicare PPS losses in PPS 2 and in PPS 7							
				Dollar amount per discharge			
PPS 7	5,225	7.7	4,531	641	28	1	24
PPS 2	3,613	—	3,155	415	18	0	25
				Percent distribution			
PPS 7	100.0	—	86.7	12.3	0.5	0.0	0.5
PPS 2	100.0	—	87.3	11.5	0.5	0.0	0.7

¹Includes estimated Graduate Education Program costs.

NOTE: For definition of PPS 2 and PPS 7, see "Introduction."

SOURCE: Health Care Financing Administration: Medicare Cost Reports.

Table 12

Case-mix index changes and annual percent changes, by Medicare prospective payment system (PPS) profit status: PPS 2 (1985) and PPS 7 (1990)

Profit status	Case-mix index level		Average annual percent change
	PPS 7	PPS 2	
All hospitals	1.333	1.178	2.5
Category 1 ¹	1.355	1.199	2.5
Category 2 ²	1.334	1.178	2.5
Category 3 ³	1.224	1.086	2.4

¹Hospitals with Medicare PPS net profits in PPS 2 and PPS 7.

²Hospitals with Medicare PPS net profits in PPS 2 and net losses in PPS 7.

³Hospitals with Medicare PPS net losses in PPS 2 and PPS 7.

NOTE: For definition of PPS 2 and PPS 7, see "Introduction."

SOURCE: Health Care Financing Administration: Office of the Actuary.

the identity imposes constraints on what rates of change in hospital outputs and productivity rates can be reasonably considered (i.e., for given rates of change in expenses and input price indexes, values for changes in hospital outputs and productivity rates are constrained).

Another implication of the assumption that the CPI Hospital and Related Index represents hospital list prices is that hospital output transaction prices are growing more slowly than hospital output list prices. One measure of the difference in the rate of change in list prices relative to transaction prices in the hospital sector is the rate of change in the ratio of gross patient revenues to net patient revenues obtained from Medicare cost reports and the AHA Annual Survey. This relationship has been quantified (Fisher, 1992).

Capital-related expenses and direct medical education expenses represent unreduced amounts allocated to Medicare by the usual cost allocation procedures.

Reduced amounts for capital-related and direct medical education pass-through amounts are shown in Table 10. Capital-related expense data are obtained from currently available files of Medicare Cost Reports submitted by hospitals to HCFA. A substantial portion of these files contain unaudited Medicare cost reports because audited reports are not currently available or will be submitted at a later date. Studies by HCFA indicate that capital-related expenses tend to be overreported on unaudited reports and that audited reports result in lower capital-related costs (*Federal Register*, 1991). To the extent that capital-related costs are overreported, Medicare inpatient PPS net profits of hospitals are understated and non-Medicare sector net profits are overstated.

Acknowledgment

The author wishes to thank members of the Office of National Health Statistics for their helpful suggestions and support.

References

- Ashby, J.L., Jr.: *the Accuracy of Cost Measures Derived from Medicare Cost Reports*. Prepared for the Prospective Payment Assessment Commission, Washington, DC. *Hospital Cost Management Accounting*, Jan. 1992.
- Medicare Program: Changes to the Inpatient Prospective Payment System and Fiscal Year 1992 Rates. *The Replication of 1982 Study of Resource Costs in Twenty-Five Hospitals*, Contract DHHS-100-88-0038. Prepared for the Department of Health and Human Services. Center for Health Policy Studies: Columbia, MD. 1990.
- Federal Register*: Vol. 56 No. 169, 43367. Office of the Federal Register, National Archives and Records Administration. Washington. U.S. Government Printing Office, Aug. 30, 1991.
- Fisher, C.R.: Trends in total hospital financial performance under the prospective payment system. *Health Care Financing Review* 13(3):1-16. HCFA Pub. No. 03329. Office of Research and Demonstrations, Health Care Financing Administration. Washington. U.S. Government Printing Office, Spring 1992.
- Williams, D., Hadley, J., and Pettingill, J.: Profits, community role, and hospital closure: An urban and rural analysis. *Medical Care* 30(2):174-187, Feb. 1992.