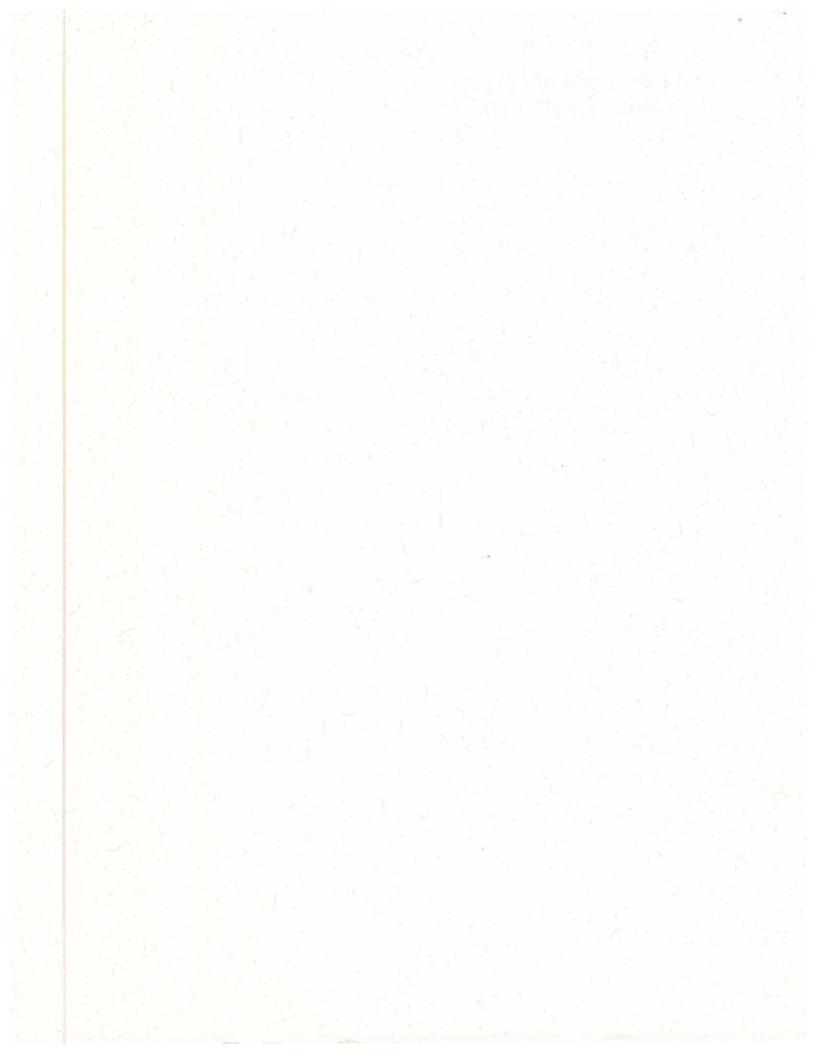# Exploding Myths about Hospital Pricing Policies

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How Fast are Hospital Prices Really Rising?

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How Fast are Hospital Prices Really Rising?

Abstract

The hospital services component of the Consumer Price Index (CPI) measures the cost of hospital services to private patients paying list prices. It is, however, widely used as an estimate of the overall rate of inflation in hospital prices. There are strong reasons to believe that it is inappropriate to use the CPI for this purpose. This is because: (1) A growing number of patients are enrolled in HMOs and PPOs, which negotiate discounts from list prices; (2) the size of the discounts may have been increasing. The potential result is a gap between the rate of inflation of list prices and the rate of inflation of actual prices paid in transactions.

We explore whether such a gap exists and determine its possible magnitude. We compute parallel indices for list and actual prices, based on data from California hospitals for fiscal years 1983 through 1988. Our analysis suggests that list price inflation has greatly exceeded actual inflation -- by a factor of two for recent years. These findings have broad implications for evaluating not only inflation, but also the impact of cost containment strategies.

How Fast Are Hospital Prices Really Rising?

I. Introduction

Discussions of hospital price inflation routinely cite the hospital services index (HSI) component of the consumer price index (CPI).[1] Through the HSI, the Bureau of Labor Statistics (BLS) seeks to measure the direct payments by patients purchasing a representative market basket of hospital services. This payment is relevant to uninsured patients and to insured patients who have not yet used up their deductible and/or make a copayment equal to a percentage of the bill. Although the direct patient payments tracked by the HSI represent only a small percentage of the total hospital bill, the HSI is the only component of the CPI that focuses specifically on changes in hospital prices. Quite naturally, it serves as the basis for discussions of hospital price inflation. Since 1982, the CPI hospital services index component has increased at over twice the inflation rate for the CPI for all items. (National Center for Health Statistics, 1990).

How appropriate is the HSI for measuring overall hospital inflation? The index is computed using data on hospitals' official published charges for services (Ford and Sturm 1988); i.e.; the index uses "list" prices. Economists such as Stigler and Kindahl (1970), Carlton (1986) and others caution against using list prices in price indices because they may diverge from the actual prices at which transactions occur; i.e., the "net" prices. In his 1988 Baxter Foundation Prize Address, Joseph Newhouse specifically raised this issue regarding the HSI as a measure of the overall rate of

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[1] See Wolinsky (1989) and Griffin (1990) for examples of newspaper articles that report list price inflation.

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hospital inflation. He observed that "the Consumer Price Index measures what hospitals ... charge a full-paying patient, but few patients pay in that manner. As a result, cost savings from more persons joining health maintenance organizations or preferred provider organizations are not captured by the Consumer Price Index." (Newhouse, 1989, p. 23)

In this paper we explore biases that may be created by using list prices for full-paying patients to measure overall hospital price inflation.[2] Analyzing data from California for the fiscal years 1983-1988, we find that the rate of inflation of list prices exceeded the rate of inflation of net transaction prices by as much as a factor of two. This suggests the importance of using net prices rather than list prices to compute measures of the overall rate of hospital price inflation.

II. The Difference Between List and Net Prices

When evaluating the overall rate of inflation of hospital prices, it is appropriate to examine the prices paid for services, net of any discounts or other adjustments. We call these transaction or "net" prices. An example would be a price list negotiated between a PPO and a hospital. Currently, however, the overall rate of inflation of hospital prices is evaluated using posted hospital charges, which we call "list" prices.

Using list prices to estimate an index for hospital services is analogous to using automobile "sticker" prices to estimate an index for

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[2] There are other important issues regarding the HSI. For example there may be difficulties in controlling for changes in the quality of services and changes in the number of units of service required to produce a given treatment. The interested reader is referred to Feldstein (1988) and Newhouse (1989).

automobile prices. The problem with using auto sticker prices should be obvious to anyone who has purchased a new cars -- most new car purchasers negotiate discounts from the sticker price. List prices for hospital services, like auto sticker prices, are routinely discounted; i.e. a "wedge" exists between list and net prices. As a result, using list prices to compute a price index may lead to an overestimate of the price level. This does not mean that the inflation rate will be overstated. However, if the rate of list price inflation exceeds the rate of net price inflation, i.e., the size of the "wedge" increases, the rate of inflation will be overstated. While there may be no reason to suspect that the rate of automobile price inflation is overstated, there are numerous reasons to suspect that the rate of hospital price inflation has been overstated.

III. Why the Wedge Between List Prices and Net Hospital Prices May Be Rising

In general, list prices represent the maximum price a hospital charges for a service to any buyer. Some buyers, for example Health Maintenance Organizations (HMOs) and Preferred Provider Organizations (PPOs), may negotiate significant discounts. Just as with the discounts negotiated by individual car buyers, these insurer discounts create a wedge between the list price and the net price. Over the past decade hospitals have had incentives to (1) decrease net prices and (2) increase list prices.

Hospitals have always offered discounts from list price. However in the past this usually took the form of providing some uncompensated care and occasionally offering discounts to HMOs, whose enrollments were limited. Not only have HMO enrollments expanded, but recent changes in state insurance enabling laws have spawned the growth of Preferred Provider Organizations.

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Like HMOs, these organizations negotiate volume discounts. In California, the number of PPOs has grown from near zero in 1982 to 52 in 1985 to 152 in 1988. The number of eligible employees in these PPOs has grown at a similar pace, to nearly six million in 1988.[3] As HMO and PPO growth continues, the fraction of patients paying list prices continues to fall. As a spokeswoman for the Michigan Hospital Association recently commented "...charges are pretty meaningless. Posted charges are paid only by a very small proportion of patients" (Mayer, 1989).

PPOs have been able to obtain impressive discounts from charges. For example, Rice et al. (1985) report that in 1985, only 6% of PPOs paid full charges. The discounts received by those PPOs paying less than full charges averaged 12-17% in 1985-1986, according to de Lissovoy et al. (1987). A consequence of the growth in the number of PPO eligibles and the impressive discounts that PPOs are able to obtain is that the average net price paid by all privately insured patients may be falling relative to the list price.

At the same time that hospitals are extending discounts to greater numbers of patients, they have had growing incentives to increase list prices for at least two reasons. First, if PPOs are enrolling the most price-sensitive patients, then those not in PPOs will be the least price sensitive. Hospitals can increase profits by raising the prices charged to these individuals. Second, to the extent that hospitals are not charging profit-

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[3] Source: American Association Of PPOs Directory of Preferred Provider Organizations, 1989.

maximizing prices, they may respond to cutbacks in Medicaid and Medicare by "cost-shifting," i.e., raising list prices (Dranove, 1987).[4]

If we are correct about the growth of discounting and the increase in list prices, then the wedge between list and net prices must be increasing. The result is a gap between list price inflation and net price inflation. In the remainder of the paper we estimate the magnitude of the gap for hospitals in California in the fiscal years 1983-1988.

IV. Price Index Analysis

Constructing a price index requires identifying the appropriate market basket. Typically (e.g., the CPI), the market basket chosen is the set of goods and services purchased in a base period. In particular, let Q_0 be a vector of quantities of goods and services purchased in year 0, with corresponding year 0 prices P_0. Let P_1 be the vector of prices for the following year. Then the "consumer price index" for the base year and the end year 1, I_{01}, is given by

$$I_{01} = \Sigma P_1 Q_0 / \Sigma P_0 Q_0.[5]$$

Note that the denominator equals aggregate expenditures in the base year. The numerator, however, does not equal aggregate expenditures in the end year (i.e., $\Sigma P_1 Q_1$), unless the market basket is unchanged (i.e., $Q_1 = Q_0$).

The inflation rate between two years may be calculated from the index as follows: Inflation rate = $(I_{01} - 1) \times 100$.

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[4] Note that if the hospital is already charging profit maximizing prices then cutbacks in Medicaid or Medicare prices could lead to reductions in prices for private patients.

[5] The notation is simple but slightly abusive. ΣPQ is just the vector product over the goods and services included in the market basket.

The BLS Hospital Price Index

As described by Ford and Sturm (1988), the BLS calculates a hospital price index in the following way, based on the formula discussed above:

1) Separate indices are calculated for "hospital room" prices and "other inpatient services."

2) The cost of a hospital room is priced using the list price for "room and board for any type of hospital room, such as private, semi-private, routine nursery, intensive care or coronary care."

3) Other inpatient services which are defined to include "hospital services for inpatients, such as laboratory tests, radiology, operating room, ..." are also priced on the basis of list prices.

4) Stratified sampling techniques are employed to identify the quantities of each of the above services. The stratification seeks to capture not only "how much consumer units spend for each category of consumption," but also "where they make the purchase."

Our price indices

Our objective is to compare price indices using list and net prices. Comparable data to that used by the BLS for actual prices is not available. However, list and net prices can be estimated from data available from the California Office of Statewide Health Planning. In our analysis we use documented and undocumented California data for the fiscal years 1983-1985, and 1987-1988 to reconstruct, as best as we can, both the price index as it would have been calculated by the BLS, and a price index that uses net

prices.[6] California is not, of course, fully representative of the nation as a whole. But our results indicate the general magnitude of potential biases inherent in the BLS approach.

The State of California requires each hospital to report, for a detailed list of daily hospital services and ancillary services, "units of service", "gross revenues," and "deductions from revenue." The data are reported by type of payer. We restrict our attention to private patients. The definition of "units of service" varies by service (e.g., the unit of service for daily hospital services is a patient day). "Gross revenue" is defined to equal the product of list prices and units of service. Thus, if we let R_g denote gross revenue from private patients for a given service, and Q denote the units of service, we can calculate the list price: $P_l = R_g/Q$.

"Deductions from revenue" may be denoted R_d. The net transaction price paid by the average private patient may be estimated by $P_n = (R_g - R_d)/Q$. In the data set deductions from revenue are comprised of: (1) contractual allowances (the focus of this paper); (2) bad debt; and (3) charity care. Increases in any of these could create a wedge between P_l and P_n. However, bad debt for California hospitals as a group has remained constant during the mid-1980s at roughly 6.75% of gross hospital revenue. Moreover, charity care makes up only 0.2% of gross revenue for private hospitals. Accordingly, the reported net price indices and the wedge between net and list price inflation should only reflect changes in list prices and in contractual allowances.

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[6] Data for FY86 was not available to us. Fiscal years are reported in the usual fashion with one exception. Data for hospitals whose fiscal years are coincident with calendar years are reported in the subsequent year. For example, if hospital X's fiscal year runs 1/1/82-12/31/82, then the data for that hospital is reported in the FY1983 data set. For further details about the data and construction of the price indices, please contact the authors.

One major problem with the California data and, almost surely, the BLS data, is the definition of the units of service. Because of specification issues, we chose to exclude certain services from our index. For example, we excluded psychiatric acute services from the list of daily hospital services, because: 1) a large percentage of patients are treated outside of general hospitals, and 2) there have been dramatic changes in practice patterns over time. Both can lead to problems in inter-year comparisons. Table 1 lists the services that we included in our market basket, along with their average percentage contribution (based on net revenues) to the total market basket for hospitals in our sample. Together these services account for roughly 77% of hospital net revenues for inpatient services. Given a core of basic services, (e.g., med/surg acute, intensive care, surgery and recovery, and clinical laboratory), our results appear to be robust to the actual services chosen for inclusion in the basket.

Given the market basket of services identified in Table 1, we constructed price indices for each private short-term general hospital in California. We calculated separate price indices for each year -- in each case we let the base year be FY83. We excluded the following types of hospitals: (1) Government hospitals; (2) Kaiser hospitals; (3) Hospitals not reporting price data; and (4) Hospitals reporting zero or negative prices. Government hospital data are problematic for the purposes of this paper because of the issues of public subsidies and charity care. As a practical matter, inclusion of government hospitals does not materially change our results. Kaiser hospitals do not report prices. There were as many as 27 hospitals not reporting price data (in FY88) and 3 reporting zero or negative prices. Our sample varies from 357 in FY84 to 327 in FY88. In keeping with

the BLS goal of weighting according to where private paying patients actually purchase services, we weight each hospital's price index by its share of aggregate net revenues statewide.[7]

V. Price Index Results

Table 2 presents list and net hospital price indices for FY83-88, as well as the Western region CPI for all items, as reported by the BLS. (We set all indices for FY83 equal to 100). Table 3 reports annualized inflation rates based on the data in Table 2.[8] List price inflation greatly exceeded net price inflation for the last four years, actually doubling net price inflation over the last three. This is consistent with an emergence of a large wedge in the wake of changes in the regulatory and competitive environment. Note that net prices rose at a rate that was approximately double that of the CPI. List price inflation was obviously much higher.

We separately calculated price indices for daily and ancillary services. The two indices were significantly correlated across hospitals at p < .01. For example, the net price indices for FY83-FY88 had a correlation of $\rho = .31$. We found that inflation was somewhat higher for ancillary services than for daily services. For the period FY83-FY88, the net price index for ancillary services was 145 whereas the net price index for daily services was only 138. The gap between list and net inflation was similar, approximately 58% for both daily and ancillary services.

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[7] This weighting closely approximates the weighting used by the BLS, but is not identical. In particular, the BLS weights by units of service provided at each hospital. Our weighting is computationally simpler.

[8] The list price inflation rates reported here are consistent with unpublished rates for the HSI for Western United States calculated by the BLS.

One possible concern is that these results are driven by outliers. In fact, we found remarkably few. For example, for the period FY83-FY88, only 1 hospital reported a net price index less than .5, and only 23 reported net price indices between .5 and 1.00. At the other extreme, only 6 reported indices above 2.50. To test for sensitivity to extreme values, we recalculated the indices when the upper and lower 1% of the distributions were excluded. The wedge was larger.

VI. Discussion

The problem with the HSI that we have observed for California is also likely to be a problem for the rest of the US. We have argued that the wedge is the result of HMO and PPO growth, and federal and state cutbacks in hospital payments. These forces are not unique to California. Admittedly, California may represent an extreme case, particularly with respect to PPOs. Based on 1989 Health Insurance Association of America survey data, medium to large employers in the west were more than twice as likely to offer a PPO option as were employers in the rest of the nation (HIAA, 1990). For this reason, the rate of growth of the wedge may have been more rapid in California for the period we studied. However, if PPO penetration in the rest of the US catches up to California, then so too may the wedge.

The perception that hospital prices are spiralling out of control is certain to affect the debate regarding the roles of regulation and competition in the hospital industry. Another consideration is whether to pin the blame for rising hospital expenditures on higher prices or higher quantities. If the results reported here extend to the United States as a whole, then price increases have not been as great a problem as has been commonly believed.

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This suggests that efforts to contain prices have been more successful than is implied by the CPI. Accordingly it may be desirable to refocus cost containment efforts to emphasize changes in the quantities and types of services, rather than prices. For example, improvements in managed care, rather than further growth in selective contracting, seem likely to have the greatest long run effect on hospital costs.

Our final observation is that the process by which hospitals set list prices and discounts off of list prices is highly complex. Macro regulatory and market variables as well as micro management and organizational considerations appear important. A fertile area for research is to explore hospital pricing behavior in more detail.

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Table 1
Services included in calculations of hospital price indices

Daily Hospital Services	% of Market Basket[*]
Medical/Surgical Acute	30.1%
Pediatric Acute	2.4
Obstetrics Acute	4.2
Medical/Surgical Intensive Care	5.0
Coronary Intensive Care	1.9
Neonatal Intensive Care	1.9
Nursery Acute	2.7

Ancillary Services:	
Labor and Delivery	2.7
Surgery and Recovery	15.3
Anesthesiology	1.9
Clinical Lab	12.8
Pathology Lab	1.1
Blood Bank	0.9
Electrocardiology	1.6
Cardiac Cath Lab	1.2
Diagnostic Radiology	5.0
Computed Tomographic Scanner	0.9
Therapeutic Radiology	0.1
Nuclear Medicine	0.9
Inhalation Therapy	4.9
Pulmonary Lab	1.2
Electromyography	0.1
Electroencephalography	0.2
Physical Therapy	1.4
Occupational Therapy	0.3

[*] Based on net revenues. Percentages do not sum to one because of rounding.

Year	List Price Index	Net Price Index	Sample size	West CPI*
FY83	100	100		100
FY84	114.4	113.5	357	104.7
FY85	122.3	119.1	355	107.1
FY86	N/A	N/A		111.6
FY87	150.3	130.8	333	115.5
FY88	169.5	139.9	327	120.2

* BLS Consumer Price Index for all items, Western Region. Source: US Statistical Abstract, 1990.

Table 3: Annualized Inflation Rates

Years	List Price Inflation	Net Price Inflation	Gap[*]	% Error[**]
FY83-FY84	14.4	13.5	0.9	6.7%
FY84-FY85	6.9	4.9	2.0	40.8%
FY85-FY87[***]	10.9	4.8	6.1	127.1%
FY87-FY88	12.7	7.0	5.7	81.4%
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FY83-FY88[***]	11.1	7.0	4.1	58.6%

[*] Gap = List inflation - Net inflation.

[**] % Error = (Gap/Net Inflation)

[***] Reported figures are annualized.