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The Balanced Budget Act of 1997 and U.S. Hospital Operations

The Balanced Budget Act (BBA) of 1997 initiated several changes to Medicare payment policy in an effort to slow the growth of hospital Medicare payments and ensure the future of the Medicare Hospital Insurance Trust Fund. Although subsequent federal legislation relaxed some original proposals, restored funds were limited and directed to specific types of hospitals. In addition, these Medicare policy changes came at a time when hospitals faced private sector payment constraints. This paper assesses the short-term effects of the BBA on operations of nonprofit hospitals in the United States and compares these effects to those observed in the early 1980s during implementation of the Medicare prospective payment system (PPS). We found that some operational changes instituted by hospitals facing financial pressures from the BBA were similar to those observed for hospitals that faced pressure from Medicare PPS, including efforts to contain Medicare cost growth, to expand outpatient service provision, and to contain hospital staffing. However, during PPS implementation hospitals experienced declining inpatient use and growing profit margins, whereas post-BBA hospitals experienced growing inpatient use and declining margins.

In August 1997, Congress enacted the Balanced Budget Act (BBA) with the intent of ending, for the first time since 1969, deficit spending by the federal government. Another BBA goal was to extend the life of the Medicare Hospital Insurance Trust Fund, which experts were projecting would be depleted by the early 2000s. This latter objective was to be accomplished by reducing future anticipated Medicare outlays to hospitals through: eliminating the inflation update to inpatient diagnosis-related group (DRG) payments for federal fiscal year 1998; limiting inflation adjustments in subsequent fiscal years; cutting capital payments; and reducing payment adjustments for indirect medical education (IME) expenses and Medicare disproportionate share hospitals (DSH). Further, it was expected that Medicare payments to hospitals would be affected by cutbacks in home health care payments instituted in 1998, and implementation of prospective payment systems (PPS) for skilled nursing facility care in 1999 and outpatient care in 2000.

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The Congressional Budget Office (1999) estimate of total Medicare program savings resulting from the BBA was $112 billion for the period 1998 to 2002. For hospitals specifically, Medicare payment savings across all sources of hospital Medicare revenue – including inpatient, medical education and DSH adjustments, capital payments, outpatient, home health, and nursing home services – were estimated to be about $72 billion for the period 1998 to 2002 and $119 billion for the period 1998 to 2004 (Heiber-White 1997; AHA 2001). The 1999 Balanced Budget Refinement Act and the 2000 Benefits Improvement and Protection Act subsequently relaxed or delayed several original BBA provisions, including lengthening the transition period for implementing reductions in IME adjustments, limiting DSH reductions, and increasing the annual inflation updates planned for PPS rates in 2001 and 2002 (MedPAC 2001).[1] These revisions were projected to restore about $21 billion (or 17.6%) of hospital payment savings for the period 1998–2004 (AHA 2001). While hospital trade organizations and public agencies argued over the specific effects these changes would have on hospital Medicare profit margins, they agreed that about 35% of U.S. hospitals would have negative total profit margins in 1999 if hospitals took no action to change operations in response to BBA and other market pressures.

Of course, when faced with payment policy changes, hospitals typically do implement operational changes to reduce costs of care and expand other sources of revenue. In two companion studies of the early effects of the Medicare prospective payment system, Feder, Hadley, and Zuckerman (1987) and Hadley, Zuckerman, and Feder (1989) found a variety of changes that occurred, especially in its first year and for hospitals that were to experience the greatest potential losses from PPS. The goals of the PPS and BBA were different – the PPS largely focused on creating new financial incentives for more efficient health care delivery, while the BBA focused on slowing the growth of Medicare payments. However, both created financial pressures that should have motivated changes in hospital operations.

This paper conducts an analysis similar to the original PPS implementation studies to assess the short-term effects of the BBA on hospital operations and to contrast how these may differ from those observed during the implementation of the Medicare PPS. For our study, we categorize nonprofit hospitals based on the degree of Medicare financial pressure they could have faced in 1998 using methods similar to earlier PPS studies. Then we assess differences in several hospital operational characteristics from the year preceding the BBA (choosing 1996 as our base year) to 1999 (a post-BBA year). BBA relief had not yet occurred in 1999 but likely was anticipated. However, as noted earlier, the relief was small relative to the magnitude of original BBA payment savings and was focused largely on teaching hospitals and those that received DSH payments. Thus, we expect that hospitals made a variety of changes between 1996 and 1999 to cope with financial pressures resulting from the BBA.

Conceptual Framework

Economic theories of nonprofit hospitals' behavior suggest that these institutions maximize the quantity and/or quality of services they produce subject to a break-even constraint (i.e., revenues equal costs) or, perhaps more realistically, a target profit level needed to maintain future operation (Hoerger 1991; Newhouse 1973). Exogenous policy changes affect the ability of a hospital to reach and maintain its target profit level. Such policy changes can include the introduction of new payment methods, as was done through the Medicare PPS for inpatient care and through the BBA for hospital outpatient services and skilled nursing care. These policy changes also can be incremental in nature, affecting the amounts that hospitals expect to be paid under existing payment methods, as occurred under the BBA for inpatient care, IME, capital, and DSH payments. In either case, exogenous policy changes create the potential for a hospital to experience an unanticipated financial loss. This should motivate the hospital to implement operational changes affecting the quantity and/or quality of its services so that it reduces the likelihood of experiencing this loss, and in turn increases the likelihood of achieving its target profit level (Hoerger 1991).

More specifically, we anticipate that a hospital facing large potential losses due to a policy change would alter its output levels and output mix. These hospitals may reduce care to Medicare patients or implement procedures to try to

treat Medicare patients more efficiently so as to minimize the actual losses they realize. These hospitals also may expand services provided to those non-Medicare patients whose payments are now relatively more generous given Medicare payment changes. Additionally, hospitals facing substantial potential losses may reduce care to certain non-Medicare patients whose payers are not particularly generous and whose care in part may have been subsidized by prior Medicare profits. Also, these hospitals may expand hospital services not affected by the policy change. For example, studies of the effects of the implementation of the PPS have noted that hospital outpatient services were expanded. This also may have occurred when the BBA was first implemented, but its benefits to hospitals may have been only short term given that a new prospective payment system for outpatient care was implemented through the BBA.

When confronted by potential losses, hospitals also may alter their production approaches in an attempt to contain production costs. Hospitals facing potentially large Medicare losses may reduce underutilized fixed inputs (i.e., hospital beds) or reduce variable inputs (i.e., hospital staffing) while trying to maintain or expand output levels. Ultimately, these changes can affect hospitalwide expenses, especially because Medicare is a major portion of most hospitals' payer mix. If adjustments in operations affecting output levels, output mix, and production approaches are insufficient, potential financial losses resulting from a policy change could translate into actual losses and hospital profit margins would decline.

Methods for Empirical Analysis

The objective of our analysis is to assess whether financial pressure resulting from the BBA led to changes in hospital operations. To this end, we created measures for potential BBA financial effects as well as specific measures for various aspects of hospital production, expenses, and financial performance that could have been affected by BBA financial pressure. Because we sought to conduct a similar analysis to that used to assess the effects of the PPS, we turned to Feder, Hadley, and Zuckerman (1987) and Hadley, Zuckerman, and Feder (1989) as guides for constructing key measures and designing analytical approaches.

These initial studies of Medicare PPS implementation provided two alternative approaches for measuring the financial effects of a policy change. Feder, Hadley, and Zuckerman (1987) constructed a measure that focused largely on the difference between Medicare PPS payments per case in year 1 of the program less Medicare costs per case in the year prior to the PPS. Given that Medicare generally paid hospitals on a cost-based reimbursement system prior to the PPS, this difference represents not only potential financial losses resulting from the new Medicare payment system but also, more simply, Medicare revenue change resulting from the PPS.

A second approach used by Hadley, Zuckerman, and Feder (1989) retained the comparison of Medicare payments in a given year to Medicare costs in the prior year. However, this measure was applied not only in the first PPS year but also in the second PPS year. Because cost-based reimbursement was no longer in place, the measure reflected purely the potential losses a hospital could experience in year 2 of the PPS if it made no change to operations. Mann et al. (1997) also used this approach for measuring Medicare financial pressure in their study of changes in hospital provision of uncompensated care during the period 1983 to 1994.

From our perspective, both approaches for measuring the effects of a policy represent important and valuable alternatives, but we believe the second approach is most relevant when one is considering the financial pressure resulting from a policy change. This occurs through the explicit comparison of revenues resulting from the policy change with a hospital's existing costs. Indeed, Hadley and his colleagues commented on this feature of their index, saying "... conceptually, the index is an estimate of the overall profit or loss a hospital might anticipate from treating Medicare inpatients if it made no changes in the costs of providing care, the volume of Medicare cases, or its total expenses" (p. 356). The first approach as used by Feder and colleagues focuses strictly on the payment change from year to year, and these simple revenue changes alone may not create financial pressure for hospitals. In particular, some hospitals will have a cushion of financial surplus that allows them to absorb the revenue loss from the policy change.

As noted, both approaches represent important alternatives and thus we conducted the analysis

using both. Hadley, Zuckerman, and Feder (1989, p. 356) constructed their financial pressure index (FPI) as:

$$FPI_{i,t} = [(PPSRT_{i,t} - MCPC_{i,t-1}) \times MCRDCH_{i,t-1}]/TOTEXP_{i,t-1} \quad (1)$$

which consists of hospital i's PPS payment rate per case (*PPSRT*) in time t, Medicare cost per case (*MCPC*) in t–1, the total number of Medicare inpatient discharges (*MCRDCH*) in t–1, and total hospital expenditures (*TOTEXP*) in t–1.

Our formula for FPI can be characterized as:

$$FPI_{i,t} = [(MRPC_{i,t} - MCPC_{i,t-1}) \times MCRADJ_{i,t-1}]/TOTEXP_{i,t-1} \quad (2)$$

which consists of hospital i's total Medicare revenues measured per adjusted Medicare admission (*MRPC*) in t, Medicare costs per adjusted admission (*MCPC*) in t–1, an estimate of Medicare adjusted admissions in t–1 (*MCRADJ*), and *TOTEXP* defined as total hospital expenses in t–1.[2] We used adjusted admissions rather than inpatient discharges to construct our Medicare FPI because adjusted admissions account for both outpatient and inpatient care, and outpatient care has become a larger portion of hospital output mix since the 1980s. We constructed our FPI using 1998 Medicare revenues, 1997 Medicare cost, 1997 estimated Medicare adjusted admissions, and 1997 total hospital expenses.[3] These 1997 values represent pre-BBA values, whereas 1998 was the first year that BBA provisions took effect.[4] We used hospital-reported net Medicare revenues for our analysis. These net revenues include not only PPS payments for inpatient discharges but also Medicare payments for outpatient services, skilled nursing facility services, capital costs, medical education, and DSH. It is important to use net Medicare revenues because BBA provisions affected all these various components of hospital revenues.[5]

Using terms similar to those previously mentioned, our Medicare revenue change index (RCI), which relates to the index used by Feder, Hadley, and Zuckerman (1987), is defined as:

$$RCI_{i,t} = [(MRPC_{i,t} - MRPC_{i,t-1}) \times MCRADJ_{i,t-1}]/TOTEXP_{i,t-1} \quad (3)$$

in which total Medicare revenues per adjusted Medicare admission in t–1 is subtracted from Medicare revenues per adjusted admission in t. It is worth noting that FPI and RCI as defined previously are related in a very specific way. Namely, if one were to add and subtract $MRPC_{i,t-1}$ within the first term of equation 2 and rearrange terms, one would obtain the following:

$$FPI_{i,t} = [(MRPC_{i,t} - MRPC_{i,t-1}) \times MCRADJ_{i,t-1}]/TOTEXP_{i,t-1} + [(MRPC_{i,t-1} - MCPC_{i,t-1}) \times MCRADJ_{i,t-1}]/TOTEXP_{i,t-1} \quad (4)$$

where the first term is exactly the RCI index noted in equation 3 and the second term is lagged Medicare profitability in t–1. Thus, FPI may be positive even when RCI is negative due to a cushion of pre-BBA financial surpluses as discussed earlier.

Following the strategy of earlier studies of the effects of the PPS, we used the FPI to rank hospitals based on the magnitude of their Medicare fiscal pressure and then divided them into three groups. Hospitals designated high FPI are those in the FPI distribution quartile that had the greatest potential loss resulting from the BBA (i.e., the quartile dominated by hospitals with large negative FPIs). Conversely, low FPI hospitals are those in the quartile that faced the least adverse impact from the BBA. Finally, we defined the category of moderate FPI to capture the two quartiles of hospitals whose FPI values fell between the low and high FPI groups. Hospitals also were ranked separately by their RCI values and then divided into high, moderate, and low RCI categories using distribution quartiles in a similar manner to that described previously. High RCI hospitals experienced the largest revenue declines with the BBA, low RCI hospitals had the lowest decline, and the moderate RCI category fell in between.

We examined both 1996 base year values for the operational indicators and changes in these indicators between 1996 and 1999. To assess differences across the FPI and RCI groups, we estimated multivariate regressions for each operational indicator under study, namely: 1) Medicare costs and revenues per case; 2) Medicare and non-Medicare admissions, length of stay, and number of inpatient days; 3) outpatient service provision and mix; 4) hospital inputs to production; and 5) hospital financial performance. Our models contained the hospital FPI or RCI category to capture the two different

measures of Medicare financial pressure on hospitals. The models also contained control variables for hospital bed size, teaching status, ownership status, region, and community population size. These latter control variables can affect both the operational indicators that we studied as well as a hospital's Medicare payments (e.g., only teaching hospitals receive IME payments). As such, if we did not control for them, our estimated effects for the Medicare FPI or RCI indicators could be subject to omitted variable bias.

Our regressions for 1996–1999 changes in the operational indicators also included a variable that controlled for possible regression to the mean effects. Regression to the mean is an important phenomenon that could affect our analyses: hospitals with unusually low or high values on certain 1996 operational indicators should experience larger relative changes in these indicators by 1999 as random, anomalous influences on the variables dissipate. If we did not control for such phenomena, changes in certain indicators between 1996 and 1999 could be incorrectly construed as being related to a hospital's FPI or RCI category when they were not. Our control for regression to the mean is one used by Dranove and Cone (1985); they included a measure of the difference between a hospital's actual and predicted values for a variable (in their case, hospital costs) as an extra control measure in a multivariate model that examined changes in hospital costs over time. In our case, we used the 1996 base-year regression models that we described earlier and which included controls for hospital bed size, teaching status, ownership status, region, and community population size to generate the predicted values used to construct controls for potential regression to the mean effects.

Data

The data for our analysis were drawn from the 1996–1999 American Hospital Association (AHA) Annual Survey. The annual survey collects data each year from hospitals nationwide regardless of their membership status and typically obtains an overall response rate of 85% or greater. Of course, item-specific responses vary, with higher response rates for questions on basic organizational characteristics (e.g., ownership type, service type, facilities and services offered) and lower response rates for revenue and uncompensated care items. Generally, nonprofit hospitals provide more complete data to the AHA than for-profit hospitals, and our analysis focused on urban, short-term general nonprofit hospitals that were in continuous operation between 1996 and 1999. In total, we identified 1,218 hospitals with sufficient data to measure FPI, RCI, and the operational measures noted earlier.

A limitation of our study is the examination of aggregated Medicare payment data and highly aggregated patient data. Currently, a number of studies have examined the effects of specific Medicare payment changes through the BBA on home health care, post-acute care, outpatient care, and graduate medical education (Angelelli et al. 2002; Gage 1999; McCall et al. 2002; 2003; Murkofsky et al. 2003; Miller, Dunn, and Richter 1999; Mohr et al. 1999). However, there has not yet been a careful study to assess how different groups of patients, as categorized by specific payer types or by other patient characteristics, are affected by hospital financial pressure. State-level data on inpatient discharges and analysis of these data may allow more insights in this regard, but these data are limited to the inpatient side of hospital business and early PPS studies indicated that outpatient care was particularly affected by Medicare policy changes. We expected changes in this area as well and decided to use the aggregated data available to us despite its limitations.

Empirical Analyses

We begin first by examining the characteristics of hospitals based on their FPI and RCI category to identify those that had a relatively small or large impact from the BBA in terms of potential losses or revenue changes, respectively. Next we discuss differences in various operational measures and their changes over time across hospitals grouped by FPI and RCI. This latter discussion will focus primarily on the FPI, noting how results are similar or different based on the RCI.

Hospital Characteristics by Medicare FPI and RCI

Table 1 provides basic organizational and market descriptive data for our study hospitals grouped by the Medicare FPI and RCI. Differences across the FPI categories in all hospital and market characteristics, except ownership type, were statistically significant ($p \leq .05$). Hospitals dominating the high FPI group, which were most adversely

Table 1. Characteristics of nonprofit hospitals classified by Medicare financial pressure index (FPI) and Medicare revenue change index (RCI)

Hospital characteristics	Medicare FPI (%)			Medicare RCI (%)			All study hospitals (%)
	Low	Moderate	High	Low	Moderate	High	
Ownership status							
Voluntary nonprofit	85.6	82.5	83.7	85.8	84.0	80.3	83.5
Public	14.4	17.5	16.3	14.2	16.0	19.7	16.5
Teaching status[a,b]							
COTH member	16.5	15.5	5.1	10.2	13.9	8.6	13.0
Non-COTH	83.5	84.5	94.9	89.8	86.1	91.4	87.0
Bed size (staffed and set-up)[a,b]							
0–99	14.7	13.9	29.2	18.1	14.5	24.3	18.0
100–299	51.2	49.9	44.2	52.8	51.6	48.9	48.8
300–499	23.2	23.5	17.3	20.7	21.1	18.5	21.8
500+	10.9	12.7	9.3	8.5	12.8	8.3	11.4
MSA population size[a]							
<250,000	11.2	18.0	25.0	18.7	18.7	16.0	18.2
250,000 to 1 million	26.0	31.2	36.6	27.4	32.9	33.2	31.4
1 million +	62.8	50.6	38.1	53.9	48.1	50.5	50.2
(not available)[c]	0.0	.2	.3	0.0	.3	.3	.2
Region[a,b]							
Northeast	29.8	23.7	20.5	23.0	22.0	19.3	24.3
South	36.8	29.6	25.0	36.1	32.6	38.7	30.1
North Central	12.3	33.3	42.3	21.9	31.5	27.3	30.7
West	21.1	13.4	12.2	19.0	13.9	14.7	14.9

Note: FPI = financial pressure index; RCI = revenue change index.
[a] Hospital and market characteristics significantly different across Medicare FPI categories at $p \leq .05$.
[b] Hospital and market characteristics significantly different across Medicare RCI categories at $p \leq .05$.
[c] Hospital is in an area where population size data are missing.

affected by the BBA, more often: were nonteaching, as measured by membership in the Council of Teaching Hospitals (COTH); had fewer staffed beds; were located in smaller metropolitan statistical areas (MSAs); and were located in the north central region of the United States. The results for hospitals grouped by RCI parallel those noted previously in several regards. Hospitals that experienced the greatest adverse revenue change from the BBA (i.e., high RCI) more often were nonteaching and had fewer staffed beds. However, they tended to be located in moderate-size MSAs and in the South.

Some of these results are not surprising given studies that examined the characteristics of hospitals likely to be most affected by the BBA (Ernst & Young and HCIA-Sachs 2000; AHA 2001), but the finding for COTH teaching status was interesting. Teaching hospitals, especially large academic medical centers, were considered by some to be highly vulnerable to BBA payment changes related to IME and DSH. Indeed, concern about potential hardships for these hospitals was a major factor in BBA relief legislation implemented in 1999 and 2000. However, our findings in Table 1 suggest that a very small percentage of hospitals facing BBA financial pressures were teaching hospitals. This finding is consistent with observations of Guterman (1998) that the principal effect of the BBA was to reduce rather than eliminate high Medicare surpluses of certain hospitals. As reported by the Medicare Payment Advisory Commission (MedPAC) (2003a), major teaching hospitals had pre-BBA Medicare margins of around 17% to 19%, whereas Medicare margins for hospitals overall were around 10% in these years. Relating this to our equation 4, even though some teaching hospitals may have had large revenue reductions with BBA, as measured by the first term in equation 4, these hospitals enjoyed substantial pre-BBA surpluses as measured by the second term of the equation, which cushioned the resulting financial pressure they experienced.

Table 2. Medicare cost and revenue per adjusted admission: 1996 level and 1996–1999 percentage change by Medicare financial pressure index and Medicare revenue change index

	Medicare FPI					Medicare RCI				
	Low	Moderate		High		Low	Moderate		High	
	Average	Average	Moderate vs. low	Average	High vs. low	Average	Average	Moderate vs. low	Average	Moderate vs. high
Medicare cost per adjusted admission										
1996 level ($)	5,765	6,078	+313**	6,896	+1,131***	6,056	6,240	+184	6,017	−39
1996–1999 % change	9.6	4.9	−4.7***	.9	−8.7***	9.8	2.9	−6.8***	.4	−9.3***
Medicare revenue per adjusted admission										
1996 level ($)	5,838	5,710	−128	5,963	+126	5,756	5,865	+109	5,868	+112
1996–1999 % change	7.6	2.9	−4.7***	−.8	−8.3***	8.8	1.1	−7.7***	−3.9	−12.7***

Note: Averages constructed from OLS regressions that controlled for hospital size, teaching status, ownership type, MSA size, and region. Regressions for 1996–1999 changes also controlled for potential effects of regression to the mean. FPI = financial pressure index; RCI = revenue change index.
* $p \leq .10$.
** $p \leq .05$.
*** $p \leq .01$.

BBA and Hospital Operational Changes

Tables 2 through 5 report on our hospital operational indicators and how they related to hospital FPI and RCI categorization. The structure of these tables is identical and thus described here. Each table reports the 1996 average level and the 1996 to 1999 average change for the operational indicators, adjusted for differences in hospital bed size, teaching status, ownership status, community population size, and region. More specifically, we computed adjusted ordinary least squares (OLS) means for each operational indicator and for each FPI and RCI category using the regression coefficients, holding the control variables constant at their mean values. Because many operational indicators were examined, there were many underlying OLS regressions. The Appendix Table reports regression models specific to the FPI results reported in Table 2. Regression results for indicators in other tables are available from the lead author on request.

Tables 2 through 5 also report the differences in averages between the moderate FPI (RCI) group vs. the low FPI (RCI) hospital group and between the high FPI (RCI) group vs. the low FPI (RCI) group. The low FPI and low RCI categories were used as our benchmarks because these hospitals had the least adverse impacts from the BBA and thus had less need to change operations. We also report statistical tests of whether the moderate vs. low FPI (RCI) and high vs. low FPI (RCI) differences were significantly different from zero.

BBA and Medicare costs and revenues per adjusted admission. Beginning with the FPI findings, Table 2 reports that low FPI hospitals in 1996 averaged $5,765 in Medicare costs per adjusted admission, whereas moderate FPI hospitals averaged $6,078 and high FPI hospitals averaged $6,896. Differences in costs between moderate vs. low FPI hospitals (+$313) and between high vs. low FPI hospitals (+$1,131) were significantly different from zero. While Medicare costs differed significantly in 1996 across hospital FPI groups, Medicare revenues per adjusted Medicare admission did not. Average revenues per Medicare adjusted admission ranged from $5,710 to $5,963, and the revenue differences for high vs. low FPI and moderate vs. low FPI hospitals were not significant.

Between 1996 and 1999, in all three FPI groups of hospitals, Medicare cost increases were greater than Medicare revenue increases. Low FPI hospitals, which were those under the least stress from Medicare, had increases in Medicare revenues per adjusted admission that averaged 7.6% and increases in costs averaging 9.6%. Moderate FPI hospitals had increases in Medicare revenues per case of 2.9% and cost increases averaging 4.9%. High FPI hospitals were confronted by a decrease in Medicare revenues that

Table 3. Inpatient hospital care: 1996 levels and 1996–1999 percentage change by Medicare financial pressure index and Medicare revenue change index

	Medicare FPI					Medicare RCI				
	Low	Moderate		High		Low	Moderate		High	
	Average	Average	Moderate vs. low	Average	High vs. low	Average	Average	Moderate vs. low	Average	High vs. low
Medicare patients										
Number of admissions										
1996 level	4,298	4,157	−140	3,997	−301*	4,027	3,949	−77	3,975	−51
1996–1999 % change	2.1	4.7	+2.6	7.1	+5.0***	3.3	4.1	+.8	7.7	+4.4**
Average length of stay										
1996 level (days)	6.8	6.8	+.1	7.1	+.4**	6.9	6.9	0	7.1	+.2
1996–1999 % change	−6.9	−5.8	+1.1	−7.1	−.2	−5.5	−6.3	−.8	−6.5	−1.0
Number of inpatient days										
1996 level	30,366	29,680	−687	29,000	−1,367	29,420	27,644	−1,777	28,362	−1,059
1996–1999 % change	−4.4	−1.0	+3.4*	+.1	+4.6**	−1.6	−2.3	−.7	+1.0	+2.5
Non-Medicare patients										
Number of admissions										
1996 level	6,656	6,765	+109	6,192	−464	6,095	6,623	+528**	5,992	−103
1996–1999 % change	11.4	10.4	−1.0	5.3	−6.2***	10.6	10.0	−.5	7.8	−2.8
Average length of stay										
1996 level (days)	4.7	5.3	+.6	6.3	+1.6***	5.5	5.2	−.3	5.0	−.5
1996–1999 % change	1.7	1.0	−.8	−1.7	−3.3	3.9	−.1	−3.9**	0	−3.8*
Number of inpatient days										
1996 level	33,086	34,836	+1,750	34,551	+1,465	31,972	32,974	+1,002	31,421	−551
1996–1999 % change	12.5	11.1	−1.5	4.0	−8.6***	12.3	10.9	−1.4	8.1	−4.0

Note: Average values constructed from OLS regressions that controlled for hospital size, teaching status, ownership type, MSA size, and region. Regressions for 1996–1999 changes also controlled for potential effects of regression to the mean. FPI = financial pressure index; RCI = revenue change index.

* $p \leq .10$.

** $p \leq .05$.

*** $p \leq .01$.

Table 4. Outpatient hospital care: 1996 levels and 1996–1999 percentage change by Medicare financial pressure index and Medicare revenue change index

	Medicare FPI					Medicare RCI				
	Low	Moderate		High		Low	Moderate		High	
	Average	Average	Moderate vs. low	Average	High vs. low	Average	Average	Moderate vs. low	Average	High vs. low
Outpatient visits										
1996 level	141,930	158,171	+16,241*	138,259	−3,672	142,918	138,700	−4,218	136,785	−6,183
1996–1999 % change	17.4	24.3	+6.9**	24.3	+6.9*	16.9	23.9	+6.9**	20.5	+3.6
ED visits as % of outpatient visits										
1996 level	29	28	−1.0	28	−1.0	28	28	0	30	+2.2**
1996–1999 absolute change in %	2.5	−.8	−3.3	−.1	−2.6	6.6	−.2	−.6.7	4.1	−2.5
% of surgeries-outpatient										
1996 level	60	60	+.3	60	−.3	61	60	−.8	61	−.5
1996–1999 absolute change in %	4.7	6.4	+1.7	6.5	+1.8	4.6	5.4	+.8	7.0	+2.5*

Note: Average values constructed from OLS regression that controlled for hospital size, teaching status, ownership type, MSA size, and region. Regressions for 1996–1999 changes also controlled for potential effects of regression to the mean. FPI = financial pressure index; RCI = revenue change index.

* $p \leq .10$.

** $p \leq .05$.

*** $p \leq .01$.

Table 5. Hospital inputs to service production and financial outcomes: 1996 levels and 1996–1999 percentage change by Medicare financial pressure index and Medicare revenue change index

	Medicare FPI					Medicare RCI				
	Low	Moderate		High		Low	Moderate		High	
	Average	Average	Moderate vs. low	Average	High vs. low	Average	Average	Moderate vs. low	Average	High vs. low
Inputs to production										
Staffed and set-up hospital beds										
1996 level	271	271	−.5	264	−7.6	263	261	−2.2	253	−10.2*
1996–1999 % change	−.2	0	+.2	.6	+.7	.1	1.1	+.9	−.2	−.3
Occupancy rate										
1996 level (%)	61	60	−.4	60	−.7	59	59	0	58	−1.4
1996–1999 absolute change in %	1.0	2.0	+1.0	.9	−.1	1.5	1.4	−.1	1.7	+.2
Total FTEs										
1996 level	1,278	1,333	+55	1,309	+31	1,222	1,252	+30	1,197	−25
1996–1999 % change	7.7	8.1	+.4	+3.7	−4.0**	6.2	7.2	+1.0	3.7	−2.5
FTEs per staffed and set-up bed										
1996 level	4.5	4.7	+.2	4.7	+.2	4.4	4.6	+.2**	4.5	+.1
1996–1999 % change	10.7	10.9	+.2	7.0	−3.7*	8.4	9.4	+1.0	7.3	−1.1
Payroll expense per FTE										
1996 level ($)	33,330	34,193	+863*	34,072	+741	33,389	34,069	+680	33,486	+97
1996–1999 % change	9.9	10.6	+.6	14.2	+4.2*	12.5	10.5	−2.0	13.2	+.7
Financial outcomes										
Total hospital expenses										
1996 level ($ mill)	101.8	107.2	+5.4	108.6	+6.7	99.5	102.2	+2.7	95.8	−3.7
1996–1999 % change	18.3	18.5	+.2	16.0	−2.2	17.3	17.2	−.1	16.0	−1.3
Total margin										
1996 level (%)	3.9	3.7	−.1	2.1	−1.8***	4.8	4.1	−.7	4.6	−.2
1996–1999 absolute change in %	−3.4	−2.8	+.6	−2.4	+1.0	−3.2	−2.3	+.9	−3.3	−.1

Note: Average values constructed from OLS regressions that controlled for hospital size, teaching status, ownership type, MSA size, and region. Regressions for 1996–1999 changes also controlled for potential effects of regression to the mean. FPI = financial pressure index; RCI = revenue change index.

* $p \leq .10$.

** $p \leq .05$.

*** $p \leq .01$.

averaged −.8% and had cost per admission increases of +.9%. The differences between moderate and high FPI hospitals relative to the low FPI group in cost and revenue changes were statistically significant. Thus, the FPI measure accurately captured the relative financial pressure that hospitals would be under from the BBA, and the Medicare cost changes suggest that hospitals facing the most financial pressure made the largest adjustment to their Medicare cost base.

The findings for hospitals grouped by RCI are similar to those for the FPI groups in all respects except that 1996 Medicare costs per adjusted admission did not differ across the RCI categories. However, high RCI hospitals certainly took action to limit their Medicare costs through 1999, which is consistent with the FPI findings.

BBA and inpatient hospital care. Table 3 reports hospital provision of inpatient services to Medicare and non-Medicare patients in 1996 and the changes over time. Ideally, we would have preferred to disaggregate the non-Medicare service data into more finely grained payer categories to see how Medicare fiscal pressure affected provision of care to specific payer groups, especially Medicaid patients, privately insured patients, and self-pay patients. However, the AHA Annual Survey does not collect data on these specific payer categories.[6]

In relation to Medicare inpatient admissions, low FPI hospitals had 4,298 admissions in 1996, whereas Medicare admissions averaged 4,157 and 3,997 for moderate and high FPI hospitals, respectively. High FPI hospitals had growth in Medicare admissions that averaged 7.1% between 1996 and 1999, which was 5.0 percentage points greater than the growth rate experienced by low FPI hospitals. Looking at the RCI findings, we see a similar pattern, with the high RCI group having a 4.4% greater growth rate in Medicare admissions when compared to the low RCI group.

All hospitals, regardless of FPI or RCI grouping, took action to reduce Medicare length of stay, and these changes were of similar magnitude, ranging from –5.5% to –7.1%. Before the BBA was enacted, Medicare length of stay was declining at a similar rate, namely by about 6% in 1993 to 1996 (MedPAC 2001). As such, the BBA did not disrupt this trend in length of stay for nonprofit hospitals. The number of Medicare inpatient days fell slightly over the period for the low and moderate FPI groups and remained relatively constant for the high FPI group. The RCI findings on Medicare inpatient days are similar except that the higher growth in days for the high vs. low RCI group did not attain statistical significance. Thus, although hospitals in all the FPI and RCI groups treated more Medicare cases between 1996 and 1999 (as measured by the number of Medicare admissions), declines in length of stay led to minimal change in total inpatient Medicare days.

Overall, these data suggest that high FPI hospitals and high RCI hospitals did not disproportionately reduce their involvement with Medicare patients in response to BBA pressures. If anything, these hospitals increased the number of inpatient Medicare admissions relative to low FPI hospitals. Given their efforts to constrain the growth of Medicare costs per case as illustrated in Table 2, the strategy for these high FPI hospitals may have been to simultaneously reduce costs of care for Medicare patients and increase the volume of care to these patients generally or within specific diagnostic groups in which PPS reimbursement was generous relative to costs (e.g., cardiac care).

Examination of the non-Medicare inpatient data suggests that all hospitals had similar non-Medicare admissions, ranging from 5,992 to 6,765 in 1996. All hospitals whether grouped by FPI or RCI experienced growth in non-Medicare admissions between 1996 and 1999: 11.4% for the low FPI group, 10.4% for the moderate FPI group, and 5.3% for the high FPI group. This 5.3% growth rate for the high FPI group was significantly lower than the growth rate for low FPI hospitals. The findings for hospitals grouped by RCI are again similar in pattern although the difference in growth rate between high RCI and low RCI hospitals (–2.8 percentage points) was not statistically significant.

Average length of stay for non-Medicare cases minimally changed over the study period. The low FPI and low RCI hospital groups slightly increased length of stay for non-Medicare patients whereas other hospital groups slightly reduced average length of stay. The high FPI group had significantly smaller growth in inpatient days relative to the low FPI group and a similar pattern is present in the hospital RCI categories.

These findings in conjunction with the Medicare inpatient findings are consistent with the

behavior of nonprofit hospitals suggested by Dranove (1988). He noted that nonprofit hospitals facing financial pressures from government payers may actually reduce the quantity of services provided to patients of other payers in order to facilitate increases in the price per unit of service received for these latter populations. In particular, high FPI hospitals may be limiting the growth of non-Medicare services by shedding less profitable private contracts or limiting access to services among Medicaid and self-pay patients. Of course, we lack the data to assess whether this is indeed the case. More focused future study of this issue is needed to see exactly how non-Medicare payer mix changes as a result of fiscal pressure.

BBA and outpatient hospital care. Table 4 focuses on outpatient hospital care and its composition. Data reported in the table indicate substantial growth in outpatient visits for the study period, averaging 17.4% for the low FPI group and 24.3% for the moderate and high FPI groups. These growth rates far exceeded growth in inpatient admissions and days as reported in Table 3. Hospitals grouped by RCI had a similar pattern of results. Looking across the hospital groups, we see that high and moderate FPI hospitals had significantly greater outpatient visit growth rates relative to low FPI hospitals. For the RCI groups, both the moderate and high RCI groups also had higher growth than the low RCI group, but only the moderate vs. low RCI difference is significant.

Table 4 also reports on the composition of outpatient care in relation to the mix of emergency and nonemergent care and the provision of surgery on an outpatient vs. inpatient basis. The 1996 levels and 1996–1999 changes in these variables did not vary significantly across hospital FPI groups, but the high RCI group appears to have increased the percentage of surgeries on an outpatient basis relative to the low RCI group.

BBA and hospital inputs to production and financial outcomes. Table 5 reports on two types of inputs to hospital service production – capital inputs in the form of hospital beds and labor inputs in terms of full-time equivalent staffing. In terms of hospital beds and occupancy rates, we see no significant differences in 1996 levels or changes between 1996 and 1999 for hospitals grouped by FPI or RCI. Hospital size averaged between 253 and 271 beds across the various hospital categories, and there was little change in bed size between 1996 and 1999. Bed occupancy rates ranged from 58% to 61% in 1996 and increased by about one to two percentage points by 1999 for all hospital groups.

Although little variation in capital inputs to production was present, we do see significant differences in hospital labor inputs across the FPI groups. Hospitals in the three FPI groups had similar average numbers of full-time equivalent staff in 1996 (around 1,300 per hospital) but the growth in full-time equivalent staff for high FPI hospitals was only 3.7% between 1996 and 1999, compared to 7.7% for low FPI hospitals and 8.1% for moderate FPI hospitals. It is important to recall that this relatively slower growth in labor inputs for the high FPI hospitals occurred at a time when they had relatively larger growth in hospital outputs, especially in Medicare inpatient admissions (Table 3) and outpatient visits (Table 4). Results for hospitals in RCI categories are again consistent, with high RCI hospitals experiencing lower increases in staff; the –2.5% difference in staffing growth rates between high vs. low RCI hospitals was not significant.

Ultimately, the operational decisions of hospitals affect their financial performance. The last rows in Table 5 examine hospital expenses and total margin. Study hospitals had similar levels of 1996 total expenses, ranging from $99.5 million to $108.6 million. All hospitals experienced expense growth between 1996 and 1999, which is not surprising given growth in services provided, medical price inflation, and increased staffing. Expense growth between 1996 and 1999 was not significantly different across the hospital FPI and RCI categories, ranging from 16% for the high FPI and RCI group to 18.5% for the moderate FPI group. Total margins in 1996 averaged 2.1% for the high FPI hospitals to 3.9% for the low FPI hospitals. The actions taken by high FPI hospitals to contain Medicare cost growth and expand services at best helped them maintain their relative profit position with other hospitals over time. Changes in total margins over time did not vary significantly across the FPI groups. The only material difference for the RCI groups is that they all had similar total margins in 1996. Similar to the FPI findings, actions taken by hospitals in the high RCI group to contain cost and expand services kept their total margins on par with the low RCI group.

Discussion and Policy Implications

The Balanced Budget Act of 1997 initiated several changes to Medicare payment policy in an effort to slow the growth of hospital Medicare payments and ensure the future of the Medicare Hospital Insurance Trust Fund. As already noted, estimates of hospital Medicare payment savings due to the BBA were $119 billion for the period 1998 to 2004, with subsequent restoration of $21 billion (17.6%) resulting through the 1999 Balanced Budget Refinement Act and the 2000 Benefits Improvement and Protection Act. The objective of this paper was to assess the short-term effects of the BBA on hospital operations. Although the BBA for the most part did not represent a change in payment method – at least not for hospital inpatient care – both the BBA and PPS created substantial financial pressure for some hospitals.

Our analysis used two alternative measures of the financial impact of the BBA on hospitals. As discussed earlier, one measure was motivated by the work of Hadley, Zuckerman, and Feder (1989) and Mann et al. (1997) that assessed the potential loss a hospital could experience through a policy change. The second was based on work by Feder, Hadley, and Zuckerman (1987) that focused on Medicare revenue change. As noted earlier, the two measures are related: the first incorporates the revenue change measured by the second approach and also incorporates pre-BBA profitability. Thus, the Hadley, Zuckerman, and Feder (1989) measure of financial pressure provides insights on the combined effects of revenue changes resulting from Medicare policy change and prior Medicare profitability. It would be worthwhile for future research to isolate the degree to which these two components affect and potentially interact in relation to hospital operational decisions. However, a key goal of our paper was to follow the approaches of earlier PPS analyses so that we could directly compare our findings to theirs. The following discussion compares our findings to earlier PPS studies, and examines study implications for Medicare payment policy.

Hospital Operational Changes: PPS vs. BBA

There are some similarities in the types of short-term hospital operational changes we observed for BBA financial pressure relative to earlier studies of pressures emanating from PPS implementation. In particular, these earlier studies and ours found that hospitals facing high Medicare financial pressure (relative to those with low financial pressure) tended to: 1) take actions to limit the growth of costs per Medicare case; and 2) emphasize and expand outpatient care. Also, we found that Medicare length of stay declined during the BBA period, which was also true during PPS implementation. However, the rate of decline in the period 1996-1999 was fairly uniform across the hospital FPI categories, ranging from –6% to –7%, whereas Feder, Hadley, and Zuckerman (1987, Table 2) found rates of decline around –11% to –18%, with the greatest declines among hospitals experiencing the greatest PPS financial pressure.

There are several additional important differences between our findings for BBA effects and those found for PPS implementation. Prior to and during the initiation of PPS, hospital inpatient care was declining dramatically in both the Medicare and non-Medicare sectors. The results of Table 3 suggest that inpatient care, as measured by the number of admissions, was actually growing in both the non-Medicare and Medicare sectors during our BBA study period. In addition, rather than declining as it did during PPS implementation, lengths of stay for non-Medicare patients were fairly stable. Growth in non-Medicare business and limited change in non-Medicare lengths of stay during the BBA period may have resulted due to the managed care backlash in the late 1990s, increased patient acuity, or efforts to attract more private sector inpatient business to compensate for Medicare payment constraints.

Another difference is that Feder, Hadley, and Zuckerman (1987, Table 4) found that hospitals had major staffing reductions during PPS implementation, with full-time equivalent staff reductions between 1982 and 1984 of around –6% to –10%. We found that hospitals during the BBA period experienced growth in staffing, but high FPI hospitals had significantly slower growth in this regard. In part, this may reflect differences in strategy during the BBA period to increase outputs, both inpatient and outpatient care, vs. the strategy during the PPS implementation period, which largely focused on reducing inpatient days and lengths of stay. Hadley, Zuckerman, and Feder (1989, Table 2) found that outpatient care did increase in the first year of PPS at rates of

around 11% to 18%, but these increases are small relative to the outpatient increases we observed of around 17% to 24% (Table 4).

Finally, studies of PPS implementation found hospital profits growing between 1982 and 1984, whereas we found hospital profits declining over our BBA study period. Specifically, Feder, Hadley, and Zuckerman (1987, Table 4) found increases in total margins of around three percentage points between 1982 and 1984; we found total margin reductions of around −3 percentage points between 1996 and 1999 (Table 5). This likely reflects the different hospital environments during the PPS implementation and BBA periods. The PPS fixed-payment system supplanted a cost-based reimbursement system that provided little to no incentive for hospitals to contain costs. Hospitals likely were able to identify easy actions to achieve improved efficiency as PPS was implemented, most notably better management of patient length of stay. The BBA, however, took effect well after these easy efficiency gains were implemented. Medicare length of stay during the BBA implementation years fell, but at rates comparable to pre-BBA periods, and these rates of decline did not differ by FPI or RCI level. Thus, hospitals likely found it difficult to cut costs as they absorbed BBA payment changes. Indeed, it appears that the strategy of hospitals, especially high FPI and high RCI hospitals, was to substantially increase certain outputs while only minimally increasing the number of hospital staff. Together, these actions may have generated additional net income that offset BBA losses. Also, given that total margins include not only profits/losses on Medicare patients but also profitability of non-Medicare business, declining margins between 1996 and 1999 likely reflected growing private payer pressures during this period (MedPAC 2003a).

Changing Hospital Financial Status and Medicare Payment Policy

For several years, the Medicare Payment Advisory Commission not only has examined changes in hospital input price inflation as it developed payment recommendations for the Medicare program, but also has assessed hospital profit margins for Medicare and overall hospital financial condition. This broader focus recognizes that the ability of hospitals to provide high-quality care to Medicare patients is affected by the adequacy of Medicare payments vis-à-vis costs as well as the general financial health of hospitals. Our analysis suggests that this broader focus on costs and payments is warranted because the relationship between the two, especially the potential for financial losses as Medicare policy changes, affects hospital operational decisions.

Further, our analysis has found significant declines in total margins for hospitals between 1996 and 1999. Although the specific values of total margins reported by MedPAC (2003a) vary from ours, its analysis also showed a decline in margins through 1999. Further, MedPAC reported that hospital total margins continued their decline through 2001 but stabilized in 2002. This stabilization of profit margins may bode well for the hospital industry. However, our analysis, like other studies of hospital performance, found substantial variability in hospital financial condition, and it is unclear whether stabilization of margins occurred for most hospitals or only certain groups.

Our results suggest that hospitals facing greater potential losses or greater revenue declines resulting from the BBA maintained, if not expanded, access to services for Medicare patients. However, these hospitals also increased inpatient and/or outpatient volume while limiting the growth in hospital staff. Do these actions reflect improvements in the efficiency of health care delivery or are they potential signals of quality problems if affected hospital staff are stretched too thin in providing additional care? This issue has always been important to Medicare policymakers, and it is a particular concern given the growing body of recent research that shows a link between patient outcomes and hospital staffing levels (Aiken et al. 2002; Kovner et al. 2002; Needleman et al. 2002). Research is needed to assess how financial stress may be affecting quality of care for Medicare and other patients who rely on these facilities.

Finally, there has been much recent discussion about revising IME adjustments under Medicare (MedPAC 2003b, 2003c). Currently, this adjustment allows an additional 5.5% in IME payments for each 10% increase in a hospital's resident-to-bed ratio, which is about twice the level justified by empirical evidence on the effects of teaching activity on Medicare costs. Although we found that teaching hospitals were not experiencing high levels of financial pressure resulting from the BBA when compared to nonteaching

hospitals, hospitals with major teaching programs have experienced considerable financial pressure in private payer markets. The monies these institutions receive through IME that exceed the added costs of treating Medicare patients may be essential if they cannot pass on a significant portion of health professional training costs to private payers. As pointed out by Aaron (2001) and Kane (2001) in a recent study of academic medical centers, the key to future payment policy for these institutions might be designing more targeted, institution-specific methods of financial support. Over the long term, a policy needs to be developed that holds hospitals accountable for their management decisions yet provides sufficient direct support for their public good activities, especially the training of the nation's future health care workforce.

There is a need to extend the analysis we conducted to years beyond 1999 given that the world has changed since then. With the managed care backlash that has occurred (Enthoven and Singer 1999; Reinhardt 1999), some of the private sector financial pressure on hospitals has been alleviated. Indeed, MedPAC (2002) reported that hospital payment-to-cost ratios in the private sector improved in 2000 vis-à-vis 1999. However, a recent Centers for Medicare and Medicaid Services (2003) report suggests that financially weak hospitals are getting weaker, and stronger hospitals are getting stronger. This raises the question of what has happened over time to hospitals that were at most financial risk due to the BBA: Did they have better or worse financial outcomes, and how has this affected their operations and the quality of care they deliver? It is important to address these questions because the answers affect not only Medicare patients, but all other patients treated in financially pressured hospitals.

Notes

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1 See in particular page 61 of Chapter 5 in MedPAC(2001), which examines changes in the BBA resulting from the BBRA and BIPA.

2 Adjusted admissions are calculated by the American Hospital Association each year. Basically, the measure translates outpatient visits into inpatient admission equivalents based on the relative revenue generated by an outpatient visit vis-à-vis an inpatient admission. This measure has the advantage of jointly accounting for both inpatient and outpatient care in a single output measure. We estimated Medicare adjusted admissions by multiplying AHA calculated adjusted admissions by the percentage of a hospital's gross revenues associated with Medicare patients. We used gross rather than net revenues because contractual allowances and discounts differ across payers.

3 Following earlier PPS studies, we do not adjust for inflation differences across time because FPI and RCI are intended to be measures of relative loss to contrast across hospitals rather than actual loss.

4 BBA provisions for federal fiscal year 1998 contained a major provision that affected all hospitals treating Medicare patients, namely a freeze on Medicare PPS payments rather than the customary annual inflation adjustment. In addition, hospital Medicare payments in 1998 were affected by reductions in DSH, IME, and capital payment adjustments and modifications to certain outpatient service payment formula.

5 Although this measure has the advantage of encompassing the various revenue streams affected by the BBA, its primary disadvantage is that the aggregation of Medicare payment components into a single variable makes it impossible to isolate the effects of changes in any one component on hospital operations. As such, our analysis should be viewed as providing insights on how general fiscal pressure has affected overall hospital operations and financial performance. Several existing studies have examined the effects of specific payment changes resulting from the BBA on aspects of hospital use and patient care. Angelelli et al. (2002), Gage (1999), and McCall et al. (2003) examined the impact of BBA on the use of different types of post-acute care services. McCall et al. (2002) and Murkofsky et al. (2003) examined the effects of BBA home health care reimbursement changes on use of these services. Miller, Dunn and Richter (1999) examined changes in graduate medical education support, and Mohr et al. (1999) examined the effects of outpatient payment changes on rural hospitals.

6 One advantage, however, of reporting the data as we have in Table 3, is that this facilitates comparisons to Feder, Hadley, and Zuckerman (1987), who similarly looked at changes in Medicare and non-Medicare services when assessing the effects of PPS pressure.

Appendix Table. OLS regression models for Medicare costs and revenues

Variable[a]	1996 Medicare costs per adjusted admission		1996 to 1999 change in costs per adjusted admission		1996 Medicare revenues per adjusted admission		1996 to 1999 change in revenues per adjusted admission	
	Coefficient	S.E.	Coefficient	S.E.	Coefficient	S.E.	Coefficient	S.E.
Intercept	3,336.03***	225.76	10.89***	2.14	3,422.35***	184.35	7.22***	2.39
Moderate FPI	312.96**	140.92	−4.74***	1.33	−128.19	115.96	−4.67***	1.50
High FPI	1,130.71***	167.50	−8.73***	1.57	125.57	136.90	−8.34***	1.76
COTH hospital	2,728.56***	200.38	−.10	1.82	2,708.75***	170.26	−.92	2.12
Staffed beds								
100 to 299	1,364.93***	156.51	−1.38	1.49	1,476.25***	127.51	.48	1.65
300 to 499	2,374.13***	182.99	2.06	1.73	2,426.04***	149.86	2.83	1.93
500+	3,337.18***	245.40	3.10	2.31	3,094.94***	203.66	1.82	2.61
Public hospital	575.54***	155.34	1.56	1.44	242.28*	129.66	1.70	1.65
MSA size								
250,000 to 1 million	62.04	163.12	−2.22	1.50	192.77	132.61	−.75	1.67
1 million +	750.75***	153.71	−2.17	1.42	728.47***	125.28	−2.42	1.58
Region								
South	−255.89*	133.70	−1.84	1.23	−47.31	109.40	−.28	1.37
North Central	−204.98	127.99	−1.00	1.18	−269.28***	104.68	−.71	1.32
West	1,073.86***	168.17	7.28***	1.68	1,077.36***	139.48	6.68***	1.92
1996 actual - predicted value	—	—	−.002***	.0003	—	—	−.003***	.0004
R^2	.487		.125		.551		.107	

Note: Regressions here were used to generate OLS adjusted means as reported in Table 2. S.E. = standard error.
Omitted variables included: low Medicare FPI, staffed bed size of less than 100, MSA population size of less than 250,000, and region of the Northeast.
* $p \leq .10$.
** $p \leq .05$.
*** $p \leq .01$.

References

Aaron, H.J. 2001. Introduction. In *The Future of Academic Medical Centers*, H.J. Aaron, ed. Washington, D.C.: The Brookings Institution.

Aiken, L.H., S.P. Clarke, D.M. Sloane, J. Sochalski, and J.H. Silber. 2002. Hospital Nurse Staffing and Patient Mortality, Nurse Burnout, and Job Dissatisfaction. *Journal of the American Medical Association* 288(16): 1987–1993.

American Hospital Association (AHA). 2001. The Financial Status of Hospitals. Study conducted by the Lewin Group for the American Hospital Association. Available at: http://www.aha.org/grassroots/lewinreport.asp Accessed July 10, 2002.

Angelelli, J., D. Gifford, O. Intrator, P. Gozalo, L. Laiberte, and V. Mor. 2002. Access to Postacute Nursing Home Care Before and After the BBA, Balanced Budget Act. *Health Affairs* 21 (September–October): 254–264.

Centers for Medicare and Medicaid Services. 2003. Health Care Industry Market Update: Acute Care Hospitals. Available at: http://www.cms.gov/reports/hcimu/hcimu_07142003.pdf Accessed July 29.

Congressional Budget Office. 1999. Statement of Paul N. Van de Water, Assistant Director for Budget Analysis, Congressional Budget Office, on the Impact of the Balanced Budget Act on the Medicare Fee-For-Service Program. Before the Committee on Finance, U.S. Senate, June 10.

Dranove, D. 1988. Pricing by Non-Profit Institutions: The Case of Hospital Cost-Shifting. *Journal of Health Economics* 7:47–57.

Dranove, D., and K. Cone. 1985. Do State Rate Setting Regulations Really Lower Hospital Expenses? *Journal of Health Economics* 4: 159–165.

Enthoven, A.C., and S.J. Singer. 1999. Unrealistic Expectations Born of Defective Institutions. *Journal of Health Politics, Policy, and Law* 25 (October): 931–940.

Ernst & Young and HCIA-Sachs. 2000. *The Financial State of Hospitals: Post-BBA and Post-BBRA*. Baltimore, Md: HCIA-Sachs, L.L.C.

Feder, J., J. Hadley, and S. Zuckerman. 1987. How Did Medicare's Prospective Payment System Affect Hospitals? *New England Journal of Medicine* 317(October 1): 867–873.

Gage, B. 1999. Impact of the BBA on Post-Acute Utilization. *Health Care Financing Review* 20(Summer): 103–126.

Guterman, S. 1998. The Balanced Budget Act of 1997: Will Hospitals Take a Hit on Their PPS Margins? *Health Affairs* 17(January/February): 159–166.

Hadley, J., S. Zuckerman, and J. Feder. 1989. Profits and Fiscal Pressure in the Prospective Payment System: Their Impacts on Hospitals. *Inquiry* 26(3): 354–365.

Heiber-White, J. 1997. Medicare Reforms Cut Hospital Payments, Add PSO Option. *Health Progress* (November–December): 10–16.

Hoerger, T.J. 1991. "Profit" Variability in For-Profit and Not-for-Profit Hospitals. *Journal of Health Economics* 10:259–289.

Kane, K.M. 2001. The Financial Health of Academic Medical Centers. In *The Future of Academic Medical Centers*, H.J. Aaron, ed. Washington, D.C.: The Brookings Institution.

Kovner, C., C. Jones, C. Zhan, P.J. Gergen, and J. Basu. 2002. Nurse Staffing and Postsurgical Adverse Events: An Analysis of Administrative Data from a Sample of U.S. Hospitals, 1990–1996. *Health Services Research* 37(3): 611–629.

Mann, J.M., G.A. Melnick, A. Bamezai, and J. Zwanziger. 1997. A Profile of Uncompensated Hospital Care, 1983–1995. *Health Affairs* 16(July/August): 223–232.

McCall, N., J. Korb, A. Petersons, and S. Moore. 2002. Constraining Medicare Home Health Reimbursement: What Are the Outcomes? *Health Care Financing Review* 24(Winter): 57–76.

———. 2003. Reforming Medicare Payment: Early Effects of the 1997 Balanced Budget Act on Postacute Care. *Milbank Quarterly* 81(2): 277–303.

Medicare Payment Advisory Commission (MedPAC). 2001. *Report to the Congress: Medicare Payment Policy*. March. Washington, D.C.: MedPAC.

———. 2002. *Report to the Congress: Medicare Payment Policy*. March. Washington, D.C.: MedPAC.

———. 2003a. *Report to the Congress: Medicare Payment Policy*. March. Washington, D.C.: MedPAC.

———. 2003b. Assessing Payment Adequacy and Updating Payments for Hospital Inpatient and Outpatient Services. Meeting Brief. Washington, D.C. Jan 15–16.

———. 2003c. Statement of Glenn M. Hackbarth, Chairman of the Medicare Payment Advisory Commission. *Report to the Congress: Medicare Payment Policy*. Washington, D.C. March 6.

Miller, R.S., M.R. Dunn, and T. Richter. 1999. Graduate Medical Education: 1998–1999: A Closer Look. *Journal of the American Medical Association* 282(September 1): 855–860.

Mohr, P.E., S.J. Franco, B.B. Blanchfield, C.M. Cheng, and W.N. Evans. 1999. Vulnerability of Rural Hospitals to Medicare Outpatient Payment Reform. *Health Care Financing Review* 21(Fall): 1–18.

Murkofsky, R.L., R.S. Phillips, E.P. McCarthy, R.B. Davis, and M.B. Hamel. 2003. Length of Stay in Home Care Before and After the 1997 Balanced Budget Act. *Journal of the American Medical Association* 289(June 4): 2841–2848.

Needleman, J., P. Buerhaus, S. Mattke, M. Stewart, and K. Zelevinsky. 2002. Nurse-Staffing Levels and Quality of Care in Hospitals. *New England Journal of Medicine* 346(22): 1415–1422.

Newhouse, J.P. 1973. Towards a Theory of Nonprofit Institutions. *American Economic Review* 60: 87–92.

Reinhardt, U.E. 1999. The Predictable Managed Care *Kvetch* on the Rocky Road From Adolescence to Adulthood. *Journal of Health Politics, Policy, and Law* 25(October): 897–910.