HOSPITAL OWNERSHIP AND PUBLIC MEDICAL SPENDING*

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The hospital market is served by firms that are private for-profit, private not-for-profit, and government-owned and operated. I use a plausibly exogenous change in hospital financing that was intended to improve medical care for the poor to test three theories of organizational behavior. I find that the critical difference between the three types of hospitals is caused by the soft budget constraint of government-owned institutions. The decision-makers in private not-for-profit hospitals are just as responsive to financial incentives and are no more altruistic than their counterparts in profit-maximizing facilities. My final set of results suggests that the significant increase in public medical spending examined in this paper has not improved health outcomes for the indigent.

I. INTRODUCTION

The hospital market is served by firms that are private for-profit, private not-for-profit, and publicly owned and operated. In this paper I examine how a hospital's type of ownership influences its response to profitable opportunities that are created by changes in government policy. The policy change that I exploit was designed to improve the quality of medical care for low-income individuals by significantly increasing hospitals' financial incentives to treat them. This program also substantially increased the revenues of those hospitals that had been serving a disproportionate share of the indigent. I use this plausibly exogenous change in government policy to test three different theories of organizational behavior, and then to assess the impact of hospital behavioral responses on health outcomes.

The response of organizations to changes in government policy will have an important impact on the consequences of these policies. This is likely to be especially true in the medical sector, in which the federal, state, and local governments contract directly

* I am especially grateful to David Cutler, Martin Feldstein, Edward Glaeser, Lawrence Katz, Andrei Shleifer, and two anonymous referees for many helpful suggestions. Thanks also to Randall Ellis, Claudia Goldin, Oliver Hart, Caroline Hoxby, Steven Levitt, Mark McClellan, Thomas McGuire, Joseph Newhouse, Douglas Staiger, to seminar participants at several universities, and to participants of the Harvard PF-Labor Lunch. Douglas Bagley and Holland Gollec were helpful in explaining the institutional detail of the California hospital market. Thanks to the California Office of Statewide Health Planning and Development for supplying the data. Any errors in the paper are my own. Financial support from the Alfred P. Sloan Foundation, the NBER Not-for-Profit Fellowship, and the National Institute on Aging is gratefully acknowledged.

The Quarterly Journal of Economics, November 2000

with hospitals, nursing homes, and other health care organizations to provide medical care to the elderly, the poor, and the disabled. Whether a particular policy change will have the intended effect depends critically on the reactions of those for-profit, not-for-profit, and public institutions with which the government contracts.

One theory of organizational behavior argues that the ease with which a firm's decision-makers can appropriate profits is the critical difference between private for-profit, private not-for-profit, and public firms. Private not-for-profit organizations are barred from distributing profits to individuals who exercise control over the firm [Hansmann 1980]. Employee compensation in government-owned firms is even more strictly regulated [Wilson 1989]. According to this first theory, if these constraints on compensation are much more stringent than those in profit-maximizing firms, then not-for-profit and government-owned hospitals will be relatively unresponsive to changes in the financial incentive to treat low-income individuals.

An alternative theory predicts that organizations differ primarily because of the individuals who choose to work in each type of firm. Previous work on not-for-profit firms has emphasized the altruistic nature of their decision-makers [Rose-Ackerman 1996] and their deviation from profit-maximizing behavior [Lakdawalla and Philipson 1998]. Managers in government-owned institutions have been characterized as having a strong sense of mission [Wilson 1989], aiming to maximize the well-being of the people served by their organizations. If the decision-makers in not-for-profit and government-owned hospitals have more altruistic motives than their counterparts in for-profit organizations, then this second theory suggests that they will be more inclined to use cash windfalls to improve medical care for the poor.

A third theory of organizational behavior claims that public firms differ substantially from both types of private firms because of their soft budget constraint [Kornai 1980]. Given that public hospitals are typically owned by another government entity, they may have much weaker financial incentives than do private institutions. Local governments could, for example, reduce their subsidies to public hospitals one-for-one as these facilities' revenues increase. This theory predicts that public hospitals will be relatively insensitive to changes in the profitability of patients, and that local governments will take any increased revenues that public hospitals receive.

I use a plausibly exogenous change in government policy to test each of these theories of organizational behavior. In 1990 the California state government created a program that significantly increased hospitals' financial incentives to treat indigent patients by transferring vast sums of money to hospitals that would provide a disproportionate amount of care to the poor. The effect of the Disproportionate Share Program (DSH) differed across hospitals because of the nonlinear incentives that it created. Specifically, a hospital received no money from the program if only a small percentage of its patients were indigent. But if a facility's "low-income number" reached a threshold of 25 percent, the hospital received substantial funds, with the size of the hospital's DSH payment increasing as its percentage rose above 25 percent.

My first set of findings reveals that both types of private hospitals were significantly more responsive than public facilities to the DSH incentives. After the DSH program took effect, private for-profit and not-for-profit hospitals cream-skimmed the most profitable indigent patients from public facilities while continuing to avoid the unprofitable ones. The observable reaction of for-profit and not-for-profit hospitals was quite similar, while government-owned hospitals were unresponsive to the change in incentives. This result leads me to reject the first hypothesis, which predicts that private not-for-profit hospitals should be less responsive than profit-maximizing firms to changes in financial incentives.

In my second set of empirical results, I explore how private for-profit, private not-for-profit, and publicly owned hospitals used the increased revenues they received from the DSH program. My findings reveal that local governments reduced their subsidies to public hospitals by an average of $100 for every $100 in DSH funds received, so that total revenues at these facilities did not increase. Private for-profit and not-for-profit hospitals used their DSH revenues primarily to increase their holdings of financial assets, rather than improve medical care quality for the poor. I therefore reject the theory that the decision-makers in not-for-profit hospitals are more altruistic than their counterparts in profit-maximizing firms.

Taken together, these two sets of results strongly support the soft budget constraint theory of government-owned institutions. Public hospitals behaved much differently from private facilities when their financial incentives changed and their revenues increased because they did not have a legal right to retain their

own profits. My findings reveal that the distinction between public and private firms in the hospital market is much greater than is the difference between private for-profit and private not-for-profit organizations.

In the final empirical section I examine the effect of the change in hospital behavior on health outcomes. Because public hospitals received none of the DSH funds intended for them and private firms used their funds primarily to increase their holdings of financial assets, the large increase in public medical spending did not lead to a significant increase in medical care inputs. Despite this, the reallocation of patients caused by the DSH program may have affected patient outcomes. In examining this issue, I show that areas in which a substantial share of Medicaid-insured patients were reallocated from public to private hospitals did not have better improvements in health outcomes, as measured by changes in infant mortality rates. This finding suggests that the substantial increase in public medical spending created by the DSH program has not improved health outcomes for low-income individuals.

II. Theories of Organizational Behavior

A. The Ease of Appropriating Profits

One theory of organizational behavior states that the critical difference between private for-profit, private not-for-profit, and government-owned hospitals is the ease with which each institution's decision-makers can appropriate profits. Glaeser and Shleifer [1998] argue that, because not-for-profit organizations are barred from distributing residual earnings to individuals who exercise control over the firm [Hansmann 1980], profits are less valuable to these institutions than they are to private for-profit firms. Instead of keeping the profits, the not-for-profit decision-maker uses them to increase firm perquisites, which are less valuable than cash.

If this theory is true, and if manager effort is costly, then a for-profit hospital will be more responsive than a not-for-profit facility to a new profitable opportunity.[1] Patients who are, on the margin, just profitable enough to offset a for-profit manager's

1. As Hansmann [1996] points out, not-for-profit hospitals are not representative of the not-for-profit sector as a whole. They receive fewer donations and less volunteer labor than the typical not-for-profit firm. They are, however, the largest employer in this sector—hospital employees account for approximately 40 percent of all nonvolunteer labor in not-for-profit firms.

effort costs, will not be attractive to the not-for-profit decision-maker. This theory does not imply that not-for-profit behavior will be unaffected by changes in incentives, but simply that profit-maximizing hospitals will be more responsive.[2]

Because compensation in government-owned organizations is also strictly regulated, this theory predicts that a profit-maximizing hospital will be more responsive than one owned by the government to a change in incentives, but does not make a strong prediction about the difference between the not-for-profit and public firms' responsiveness. According to this theory, the decision-makers in the three types of hospitals may have identical preferences, but react differently to financial incentives because of different constraints on the distribution of hospital profits.

B. Altruistic Decision-Makers

An alternative explanation for the difference between the three types of firms is that the decision-makers in not-for-profit and government-owned organizations have different preferences from their counterparts in profit-maximizing firms.[3] Previous work on not-for-profit organizations has emphasized the altruistic nature of their decision-makers [Rose-Ackerman 1996] or that these individuals deviate from profit-maximizing behavior [Lakdawalla and Philipson 1998].[4] Managers in government-owned firms may have a strong sense of mission [Wilson 1989] and aim to maximize the well-being of the people served by their organization.

If the decision-makers in private not-for-profit and government-owned hospitals have motives that are significantly different from the motives of managers in profit-maximizing organizations, then these hospitals will behave quite differently in response to an exogenous increase in their revenues. For example, a not-for-profit or government-owned hospital that values the well-being of indigent patients more than a profit-maximizing hospital will use some of the windfall to provide better medical care for these individuals.

2. The magnitude of this difference will presumably increase as effort costs become a more important factor.

3. Weisbrod [1988] calls this "managerial sorting."

4. Work by Newhouse [1970] and Feldstein [1971] suggests that the decision-maker in a not-for-profit hospital maximizes an objective function that positively values both the quality and the quantity of medical services provided, subject to a breakeven constraint.

As was true for the previous one, this theory does not make a clear prediction about the difference between private not-for-profit and government-owned institutions. The decision-makers in both types of organizations may react like profit-maximizing hospitals to changes in their financial incentives, but will be more inclined to use increased revenues to improve medical care for the poor.

C. Soft Budget Constraint

Unlike the previous two, the final theory emphasizes differences in the legal rights of private and public organizations. As has been argued by Kornai [1980], government-owned firms may have softer financial incentives than do private companies if they are owned by another public institution. Local governments may, for example, reduce their subsidies to public hospitals one-for-one as these facilities' revenues increase.[5]

If this theory is true, then government-owned hospitals will be significantly less responsive than private facilities to changes in financial incentives, and exogenous increases in their revenues will be taken by the local governments that own them. Both private for-profit and private not-for-profit hospitals will be able to retain their windfalls, and because of this the behavior of both types of private firms should be quite different from the behavior of government-owned organizations.

III. BACKGROUND

A. Health Care for the Poor

Low-income individuals typically do not have private health insurance. More than 47 percent of nonelderly individuals with family incomes below the poverty line received public health insurance through the federal-state Medicaid program in 1990. An additional 33 percent had no health insurance during that same year. The corresponding percentages for nonelderly individuals with family income greater than twice the poverty line were 2 and 9 percent [EBRI 1991]. Thus, the nine million Californians who were either Medicaid-insured or without health insurance were disproportionately poor.

5. Typically the soft budget constraint literature refers to the case in which public firms will be "bailed out" by other government agencies.

Hospitals have historically provided a substantial amount of medical care to the indigent. More than 30 percent of the patients admitted to a California hospital in 1990 were Medicaid-insured or uninsured. At that time a hospital that contracted with the state to treat Medicaid patients was reimbursed on a per diem basis.[6] Estimates suggest that hospital Medicaid revenues covered only 80 percent of the costs of treating those patients in 1990. Because they were typically unable to pay for their medical care, uninsured patients were even less profitable to treat. Therefore, the average costs of caring for the indigent exceeded the payments that hospitals received to treat them. Many hospitals used profits from nonindigent patients to cross-subsidize medical care for the poor [Aaron 1991]. The hospitals that served primarily indigent patients were unable to do this.

B. The Disproportionate Share Program

To address this problem, the U. S. Congress modified the Medicaid program to encourage states to improve medical care at hospitals that had been providing a disproportionate amount of health care to the poor. Each state was free to design its own Disproportionate Share Program (DSH), and would receive federal matching dollars if its program was approved by the federal Health Care Financing Administration. Spending on DSH programs nationwide grew from less than $1 billion in 1989 to almost $18 billion by 1992 [Coughlin, Ku, and Holahan 1992].

This federal legislation led to the creation of California's DSH program in late 1990. Each of the 23 counties with a county-owned safety-net provider was required to contribute money to California's DSH fund on an annual basis, which was then matched dollar-for-dollar by the federal government. These funds were then distributed directly to hospitals that had a low-income number of 25 percent or more. The low-income number was defined to be the percentage of a hospital's total costs that were attributable to Medicaid and uninsured patients. A hospital that qualified in year t received a DSH per diem for all of its Medicaid patient days in year $t + 1$. The per diem rate increased nonlinearly with the low-income number, rising from $240 to a maximum of $1052. This relationship is shown in Figure I.

6. Starting in 1985, these rates were competitively contracted. Once a California hospital has a Medicaid contract, that rate will prevail until either (1) the hospital terminates its contract or (2) the hospital requests an increase and the Medical Assistance Commission agrees to this increase. Approximately 60 percent of California's hospitals had a Medicaid contract in 1990.

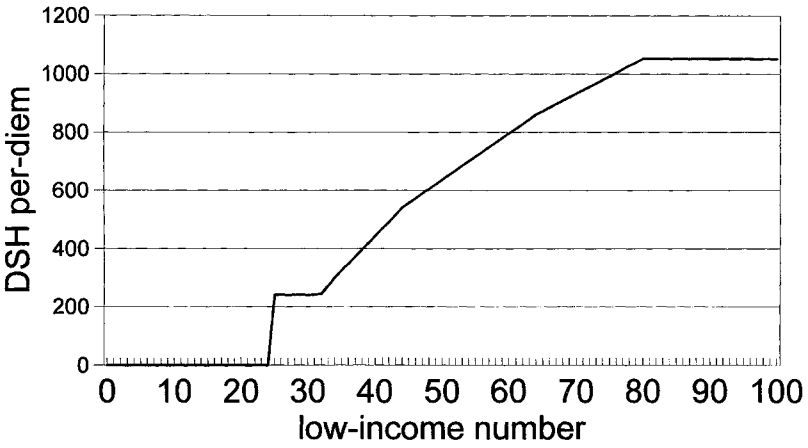

FIGURE I
DSH per diem for Private Hospital

The DSH program had two main effects. First, it significantly increased the revenues of those hospitals with a low-income number greater than 25 percent. Second, it enhanced hospitals' financial incentives to treat low-income patients. This second effect was especially great for those facilities above the 25 percent threshold or slightly below it. By attracting a few more indigent patients, a hospital slightly below the threshold with an average number of Medicaid days would receive $3 million if it qualified in the following year. For hospitals that already had qualified, the payments received for each additional Medicaid patient increased by at least 40 percent.

A hospital that did not qualify could attempt to reach the 25 percent threshold by increasing its provision of care to the Medicaid-insured or the uninsured. All else equal, a Medicaid patient was much more financially attractive, because the hospital received both the original Medicaid per diem and the DSH per diem for each Medicaid patient day.

C. Data

Data for all California hospitals and the patients served by these facilities are available annually from the state's Office of Statewide Health Planning and Development (OSHPD). The patient-level data set contains detailed information about every individual admitted to or born in a California hospital. The

TABLE I
CALIFORNIA HOSPITAL MARKET: SUMMARY STATISTICS IN 1990

Ownership type	# Hospitals	Medicaid	Uninsured	Average # beds
Private NFP	209	15.4%	6.2%	227
Private FP	104	16.7%	7.5%	135
Public	84	44.1%	14.5%	166
Total	397	21.8%	8.2%	190

Data include general acute care hospitals that were in operation in California from 1987 through 1995. Medicaid and Uninsured represent the percentage of a hospital's patients who were Medicaid-insured and uninsured, respectively.

hospital-level data provide information regarding each hospital's finances, services, employees, and type of ownership. In the empirical analysis I focus on the 397 general acute care hospitals that were in operation in California from 1987 through 1995. Within this group, 85 were government-owned and operated in 1987, while the other 312 were privately owned.[7] Table I reveals that the majority of patients at government-owned facilities were Medicaid-insured or without health insurance. In contrast, less than 25 percent of the patients at private not-for-profit and private for-profit facilities were indigent.

IV. THE REALLOCATION OF LOW-INCOME PATIENTS

Hospitals had an increased financial incentive to admit more Medicaid patients after the introduction of the DSH program. After this program was implemented in 1990, public hospitals experienced a substantial decline in the share of Medicaid-insured individuals attending their facilities. Before DSH, more than 42 percent of the state's Medicaid patients were treated at a government-owned facility, versus only 29 percent five years later. Table II reveals that this decline reflected an increase in the share of Medicaid patients attending both private for-profit and private not-for-profit facilities. During this same time period the share of uninsured patients attending public hospitals increased significantly, from 38 percent in 1990 to 48 percent in 1995.

7. Approximately 7 percent of the hospitals in the sample converted to a different ownership type between 1987 and 1995. The most common conversions were not-for-profit to for-profit (10), for-profit to not-for-profit (9), and public to not-for-profit (6).

TABLE II
THE SHARE OF MEDICAID AND UNINSURED PATIENTS AT EACH TYPE OF HOSPITAL

Ownership type	Medicaid			Uninsured		
	1985	1990	1995	1985	1990	1995
Private NFP	44.2%	45.1%	55.8%	37.8%	47.9%	41.5%
Private FP	14.9%	12.4%	14.9%	13.4%	14.5%	10.5%
Public	40.9%	42.5%	29.3%	48.8%	37.6%	48.0%

Data include all general acute care hospitals that were in operation in California in each year. Values represent the percentage of Medicaid and uninsured patients at each type of hospital in 1985, 1990, and 1995.

This reallocation of low-income patients coincided with a substantial increase in total DSH funds received both by private for-profit and private not-for-profit hospitals. Table III lists DSH payments by type of hospital for the 1991 and 1996 fiscal years (based on 1990 and 1995 Medicaid days, respectively), and shows that private hospitals increased their DSH payments more than threefold within five years, while public hospitals' DSH funds declined substantially. These data strongly suggest that both types of private hospitals responded more aggressively to the change in incentives than did government-owned institutions.

In the analysis that follows, I test the theory that not-for-profit hospitals are less responsive than profit-maximizing firms to changes in financial incentives because of their nondistribution constraint. This section also performs a preliminary test of the soft budget constraint theory, which emphasizes the incentive problem of government-owned institutions.

A. Controlling for the Medicaid Eligibility Expansions

To compare the responsiveness of hospitals to the DSH program, I examine the change in each hospital's number of

TABLE III
TOTAL DSH PAYMENTS BY TYPE OF HOSPITAL

Ownership type	1991	1996
Private NFP	66.0	184.0
Private FP	20.9	100.9
Public	1631.8	1471.6
Total	1718.7	1756.5

Dollar amounts are in millions. 1991 payments are based on 1990 Medicaid patient days. Payments for 1996 are based on 1995 Medicaid patient days.

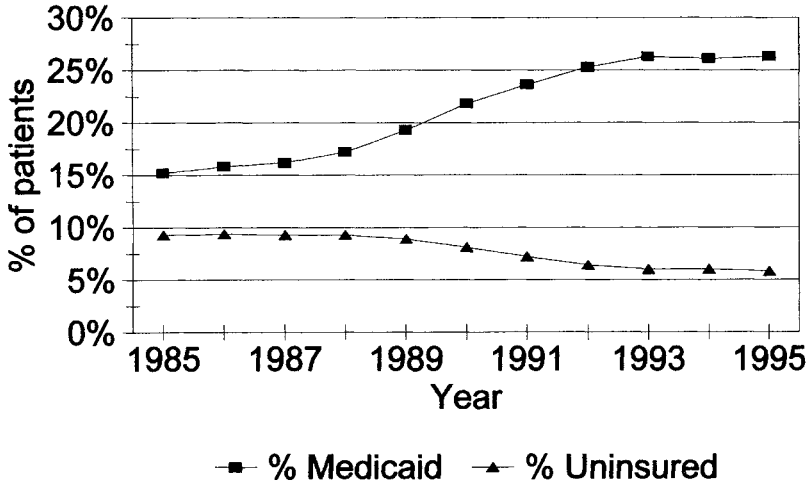

FIGURE II
Percent of Patients Medicaid or Uninsured

low-income patients. I divide indigent patients into two categories—those covered by Medicaid and those patients without health insurance. The DSH program significantly increased the profitability of treating Medicaid patients, while leaving the incentive to treat uninsured patients virtually unchanged.

The DSH program is not the only major change in public medical programs for the indigent during this time period. Expansions in Medicaid eligibility, which mainly took place from 1987 to 1993, are another important factor to consider.[8] Figure II reveals that the percentage of hospital patients insured by Medicaid rose substantially during the time period of interest, from 16 percent in 1987 to 26 percent by 1993. During this same period the share that were without health insurance fell from more than 9 percent to less than 6 percent.[9] Given the magnitude of the changes in Medicaid eligibility, it is important to control for

8. In 1986, the federal government passed legislation that led to substantial increases in the number of individuals insured by Medicaid. Prior to these expansions, single women with children who had incomes close to or below the poverty line were insured by this program. By 1993 eligibility had been extended to all female-headed households in California with incomes below 185 percent of the poverty line.

9. The decline in the share of patients without health insurance is much smaller than is the increase in the share covered by Medicaid. This is consistent with the results of Cutler and Gruber [1996], who found that the Medicaid eligibility expansions partially crowded out private insurance coverage.

this potentially confounding factor when examining the behavioral response of hospitals to the DSH financial incentives. A hospital may appear to have responded to the DSH incentives when it actually had more Medicaid admissions simply because a greater fraction of its pre-DSH patients were now Medicaid-eligible.

To control for the effect of the eligibility expansions on each hospital's patient mix, I use patient demographic and zip code of residence data to estimate the number of Medicaid patients that a hospital would have admitted in each year, absent any change in its patient mix from a base year.[10] Hospitals that served patients from predominantly wealthy zip codes in the base year have relatively small predicted Medicaid numbers. Alternatively, those hospitals that served patients from areas that were disproportionately affected by the expansions have large predicted increases. I construct a similar measure to predict the number of uninsured patients that a hospital would treat in each year.

B. Reallocation of Medicaid Patients from Public to Private Hospitals

Using 1990 as a base year, I calculate the predicted change in the number of Medicaid and uninsured patients from 1990 to 1995 at each hospital. I then use these predicted changes, $\Delta MCPRED_{95,90}$ and $\Delta UNPRED_{95,90}$, to explain the actual changes, $\Delta MEDICAID_{95,90}$ and $\Delta UNINSURED_{95,90}$. Summary statistics for these variables are provided in Table IV.

Columns (1) and (3) of Table V summarize the results for both types of indigent patients. The significantly negative estimate of -0.742 on the $\Delta MCPRED_{95,90}$ coefficient contrasts sharply with the 0.962 estimate for $\Delta UNPRED_{95,90}$. This result suggests that substantial reallocation of Medicaid patients occurred from 1990 to 1995, while the uninsured tended to remain at the same hospitals. The significantly positive estimate of 0.452 on the $\Delta MCPRED_{90,85}$ coefficient in the fifth specification shows that Medicaid patients were not being reallocated nearly so much[11] as prior to 1990.

10. The construction of this estimated measure is described in the Appendix.

11. Unlike the estimate for the $\Delta UNINSURED_{95,90}$ coefficient, this estimate is significantly different from one, suggesting that some reallocation of Medicaid patients was occurring. This is presumably due to changes in Medicaid contract arrangements. Approximately 50 general acute care hospitals terminated their Medicaid contracts between 1986 and 1990, while more than 25 facilities signed new contracts [CMAC 1996]. Despite this, it is clear that the predicted change in Medicaid patients has much more predictive power from 1985–1990 than during

TABLE IV
SUMMARY STATISTICS FOR THE IMPACT OF DSH FINANCIAL INCENTIVES ON HOSPITAL BEHAVIOR

Variable	# Observations	Mean	Standard deviation
$\Delta MEDICAID_{95,90}$	401	342	1871
$\Delta MCPRED_{95,90}$	401	347	1049
$\Delta UNINSURED_{95,90}$	401	−216	704
$\Delta UNPRED_{95,90}$	401	−220	546
$FOR\text{-}PROFIT_{90}$	401	.26	.44
$PUBLIC_{90}$	401	.21	.41
$\Delta MCAID_{90,85}$	431	637	1699
$\Delta MCPRED_{90,85}$	431	587	2193
$FOR\text{-}PROFIT_{85}$	431	.30	.46
$PUBLIC_{85}$	431	.20	.40
$MEDICAID_t$	3171	1970	3801
$MCPRED_{t,87}$	3171	1862	4971
$UNINSURED_t$	3171	611	1380
$UNPRED_{t,87}$	3171	584	1528
$LOW > 15_{t-1}$	3171	.320	.466
$DSH_t * LOW > 15_{t-1}$	3171	.230	.421
$DSH_t * LOW > 15_{t-1} * NFP_t$	3171	.087	.283
$DSH_t * LOW > 15_{t-1} * PUBLIC_t$	3171	.090	.286
$PRIVATE\ NFP_t$	3171	.530	.499
$DSH_t * PRIVATE\ NFP_t$	3171	.331	.471
$PUBLIC_t$	3171	.209	.406
$DSH_t * PUBLIC_t$	3171	.130	.336
$BEDS_t$	3171	191	152
$OBSTET_t$	3171	.735	.441

Variables defined from 1990–1995 include the 401 general acute care hospitals that were in operation from 1990–1995, while those for 1985–1990 include the 431 hospitals that were open throughout the 1985–1990 time period. These two sets of variables are used in the Table V specifications. The remaining variables include eight years of data (1988–1995) for the 397 hospitals that were in operation in California from 1987 through 1995, and are used in the Table VI specifications.

The second and fourth specifications include dummy variables for a hospital's type of ownership. Controlling for a hospital's predicted change in patient mix, publicly owned hospitals experienced a significantly smaller increase in their number of Medicaid patients and a significantly greater increase in their number of uninsured patients than did privately owned facilities from 1990 to 1995.

the 1990–1995 period. This is consistent with the view that competition for Medicaid patients intensified after 1990.

TABLE V
CHANGES IN HOSPITALS' MEDICAID AND UNINSURED ADMISSIONS: 1985–1990 VERSUS 1990–1995

	$\Delta MEDICAID_{95,90}$		$\Delta UNINSURED_{95,90}$		$\Delta MEDICAID_{90,85}$	
	(1)	(2)	(3)	(4)	(5)	(6)
$\Delta MCPRED_{95,90}$	−.742***	−.678***				
	(.081)	(.080)				
$\Delta UNPRED_{95,90}$			.962***	.984***		
			(.043)	(.043)		
$\Delta MCPRED_{90,85}$					.452***	.433***
					(.030)	(.031)
FOR-PROFIT		−270		34		−279*
		(199)		(55)		(153)
PUBLIC		−1064***		266***		358**
		(216)		(59)		(176)
CONSTANT	600	873	−5	−65	372	394
	(90)	(116)	(25)	(33)	(69)	(94)
# OBSERVATIONS	401	401	401	401	431	431
R^2	.173	.221	.555	.577	.341	.357

The first four specifications include the hospitals that were in operation in California from 1990–1995, while the final two include the facilities that were open throughout the 1985–1990 time period. PUBLIC and FOR-PROFIT are dummy variables for a hospital's type of ownership (private not-for-profit is the omitted category). $\Delta MEDICAID_{t+1,t}$ equals the change in the number of Medicaid hospital patients at a hospital from year t to $t+1$. $\Delta MCPRED_{t+1,t}$ represents the predicted change in the number of Medicaid patients, using t as the base year and the algorithm described in the Appendix. $\Delta UNINSURED_{t+1,t}$ and $\Delta UNPRED_{t+1,t}$ are the corresponding variables for the actual and predicted number of uninsured patients. Standard errors are included in parentheses.

Taken together, these results are consistent with the view that, in response to the change in financial incentives caused by DSH, private hospitals cream-skimmed the newly profitable Medicaid patients from government-owned facilities. The similarity between the two types of private hospitals does not support the theory that private not-for-profit hospitals are less responsive to financial incentives because of their nondistribution constraint. The next section provides a cleaner test of this theory.

C. Are Not-for-Profit Hospitals Less Responsive to Incentives than Profit-Maximizing Firms?

I next utilize several years of hospital data to examine whether this reallocation was a response to the DSH financial incentives or was instead caused by other factors. Hospitals that were above the 25 percent threshold or slightly below it when DSH was first introduced had a strong incentive to admit more Medicaid patients. By attracting a relatively small number of

publicly insured patients, a hospital with a low-income number slightly below 25 percent could have qualified for DSH reimbursement for all of its Medicaid patient days. Similarly, the marginal revenue associated with a Medicaid patient increased by 40 percent or more for hospitals that already had qualified. If DSH caused the reallocation of Medicaid patients described above, then one would expect hospitals above the 25 percent threshold or slightly below it to have admitted significantly more Medicaid patients after 1990.

To investigate this issue, I use eight years (1988–1995) of hospital data in running specifications of the following form:

$$
\begin{aligned}
(1)\quad MEDICAID_{jt} = {} & \beta_0 BEDS_{jt} + \beta_1 MCPRED_{jt} + \beta_2 OBSTET_{jt} \\
& + \beta_3 OWN_{jt} + \beta_4 LOW > 15_{j,t-1} \\
& + \beta_5 DSH_t * OWN_{jt} + \beta_6 DSH_t * LOW \\
& > 15_{j,t-1} + \beta_7 DSH_t * LOW > 15_{j,t-1} * OWN_{jt} \\
& + \alpha_j + \lambda_t + \epsilon_{jt}.
\end{aligned}
$$

Here $MEDICAID_{jt}$ represents the number of Medicaid patients admitted by hospital j in year t, α_j is a hospital fixed effect, and λ_t is a year fixed effect. The variable $LOW > 15_{t-1}$ takes on a value of one if a hospital's low-income number was greater than 15 percent in year $t - 1$.[12] $DSH_t * LOW > 15_{t-1}$ is defined similarly but equals zero for all hospitals from 1988–1990. I then interact this variable with a hospital's type of ownership, *OWN*, to examine whether there were significant differences across ownership types in response to the increased financial incentives to treat Medicaid patients. I interact a hospital's ownership type with a *DSH* dummy to control for other factors that were differentially affecting each of the three types of hospitals in the post-DSH period. $MCPRED_{jt}$ is hospital j's predicted number of Medicaid patients in year t, using 1987 as the base year. I also include variables to control for a hospital's service mix (*OBSTET*) and its size (*BEDS*). Summary statistics for all of these variables are provided in Table IV.

The first and third specifications of Table VI show that, consistent with the results from Table V, there was substantial reallocation of Medicaid patients but relatively little reallocation of the uninsured during the time period of interest. In the second

12. Here the time index is $t - 1$, reflecting the fact that it is the previous year's low-income number that determines the DSH reimbursement for the current year's Medicaid patients.

TABLE VI
IMPACT OF DSH INCENTIVES ON HOSPITAL MEDICAID AND UNINSURED ADMISSIONS: 1988–1995

	$MEDICAID_t$		$UNINSURED_t$	
	(1)	(2)	(3)	(4)
$MCPRED_{t,87}$	−.129***	−.114***		
	(.020)	(.020)		
$UNPRED_{t,87}$			.906***	.919***
			(.017)	(.017)
$LOW > 15_{t-1}$		78		−43
		(89)		(32)
$DSH_t * LOW > 15_{t-1}$		542***		6
		(129)		(46)
$DSH_t * NFP_t * LOW > 15_{t-1}$		161		55
		(139)		(49)
$DSH_t * PUBLIC_t * LOW > 15_{t-1}$		−628***		86
		(174)		(61)
$PRIVATE\ NFP_t$		−29		22
		(151)		(53)
$DSH_t * PRIVATE\ NFP_t$		199**		−51*
		(88)		(31)
$PUBLIC_t$		251		−101
		(231)		(82)
$DSH_t * PUBLIC_t$		20		28
		(136)		(48)
$BEDS_t$		3.40***		.34
		(.69)		(.25)
$OBSTET_t$		688***		136***
		(112)		(40)
# OBSERVATIONS	3171	3171	3171	3171
R^2	.951	.955	.956	.957

The sample includes hospital-year observations for those hospitals operating in California from 1988 through 1995. All specifications include hospital and year fixed effects. $MEDICAID_{jt}$ and $UNINSURED_{jt}$ equal the number of Medicaid and uninsured hospital patients, respectively, at hospital j in year t. $MCPRED_{jt}$ and $UNPRED_{jt}$ represent the predicted number of Medicaid and uninsured patients, using the algorithm described in the Appendix and 1987 as the base year. DSH_t equals one for the years 1991–1995, and zero otherwise. $LOW > 15_t$ equals 1 if a hospital's low-income number is greater than 15 percent, and zero otherwise. $OBSTETS_t$ equals one if a hospital has an obstetrics unit set up, and zero otherwise. $BEDS_{jt}$ equals the number of available beds at hospital j in year t. Standard errors are included in parentheses.

specification I introduce the explanatory variables described above. As the coefficients on the $DSH_t * LOW > 15_{t-1}$ coefficients show, private for-profit and not-for-profit hospitals responded significantly more aggressively to the DSH financial incentives than did government-owned firms. There is no corresponding difference between the two types of private hospitals, as the insignificant estimate on the $DSH * NFP_t * LOW > 15_{t-1}$

coefficient shows. Private hospitals that were above the DSH threshold or slightly below it admitted significantly more Medicaid patients than did public ones after the introduction of DSH. The fourth specification reveals that there was no corresponding difference for uninsured patients.

Private for-profit and private not-for-profit hospitals cream-skimmed those patients whose profitability increased significantly after the introduction of the DSH program, while reducing their share of care to unprofitable indigent patients. The two types of private hospitals were similarly responsive to the change in incentives, and both were significantly more responsive than government-owned institutions.

Based on these results, I reject the theory that the nondistribution constraint in not-for-profit hospitals leads these firms to be less responsive than profit-maximizing firms to changes in financial incentives. This set of results also provides preliminary support for the soft budget constraint theory, which emphasizes the incentive problem of firms owned by the government.

V. The Use of Cash Windfalls

Those hospitals that qualified for DSH in the first year of the program enjoyed a substantial increase in their total revenues. Immediately prior to DSH, these organizations had total revenues of $3.87 billion. Total DSH payments to them in the first year of the program were more than $1.70 billion. Qualifying hospitals therefore enjoyed a plausibly exogenous increase of 45 percent in their revenues after the introduction of DSH.

The soft budget constraint theory described above implies that local governments should have taken the cash windfalls received by public hospitals. The altruism theory predicts that decision-makers in private not-for-profit firms would have been more inclined than profit-maximizing managers to use their cash windfalls to improve medical care for low-income individuals. In this section I use hospital financial data to test both of these theories of organizational behavior.

A. Do Public Hospitals Have a Soft Budget Constraint?

I first estimate the effect of DSH funds on changes in hospital Medicaid revenue, government subsidies, and total reve-

TABLE VII
SUMMARY STATISTICS FOR THE IMPACT OF DSH PAYMENTS ON HOSPITAL BEHAVIOR

Variable	# Observations	Mean	Standard deviation
Δ MEDICAID REV	371	6320	30637
Δ SUBSIDIES	371	−3671	27462
Δ OTHER REV	371	2659	10452
Δ REVENUES	371	5307	11949
Δ COSTS	371	5100	11137
Δ NET INCOME	371	208	5623
DSH	371	4596	26626
DSH * PUBLIC	371	4172	26472
DSH * FOR-PROFIT	371	103	607
Δ NET WORTH	371	5467	25754
Δ NET PPE	371	2742	15748
Δ NET FIN ASSETS	371	2725	25192
DSHSUM	371	18383	106504
DSHSUM * PUBLIC	371	16687	105888
DSHSUM * FOR-PROFIT	371	413	2429

There are only 371 hospitals in this sample because the hospitals owned by Kaiser are not required to report financial information to California's OSHPD. None of these facilities qualified for DSH in any year. All dollar amounts are inflation-adjusted to 1990 dollars, and are reported in thousands of dollars.

nues.[13] I investigate changes in these variables from before DSH was introduced to afterwards. Instead of focusing on year-to-year variation, I use averages in the four years after the program as my measures of post-DSH variables of interest, because of substantial fluctuations across hospitals in the exact timing of DSH payments. Table VII provides summary statistics for the variables that are defined in this section. All dollar amounts are inflation-adjusted to 1990 dollars.

I use average DSH payments from 1992 to 1995 as one of my explanatory variables,[14] which I then interact with the hospital's ownership type to construct the variables (*DSH * FOR-PROFIT*) and (*DSH * PUBLIC*). I also include dummy variables for a

13. There are only 371 (instead of 397) hospitals included in these regressions because 26 of the hospitals do not report financial information. Hospitals owned by the Kaiser corporation (25 of the 26 not reporting) are not required to report financial information to OSHPD. None of the excluded hospitals qualified for DSH funds in any year.

14. I omit 1991 because it is a transition year—some hospitals that qualified initially receive some of their payments in 1991, whereas others do not receive their first payment until 1992.

TABLE VIII
IMPACT OF DSH FUNDS ON HOSPITAL SUBSIDIES AND REVENUES

	Δ MEDICAID REV	Δ SUBSIDIES	Δ OTHER REV	Δ REVENUES
DSH	1.52***	.00	−.38*	1.15***
	(.09)	(.10)	(.22)	(.22)
DSH * PUBLIC	−.39***	−1.04***	.39*	−1.03***
	(.09)	(.10)	(.22)	(.22)
DSH * FOR-PROFIT	−.04	.02	.54	.52
	(.38)	(.41)	(.92)	(.94)
PUBLIC	−935	2019***	120	1204
	(590)	(649)	(1452)	(1472)
FOR-PROFIT	−86	−216	−3605***	−3907***
	(550)	(605)	(1354)	(1373)
$BEDS_{90}$	3.58**	−.57	13.29***	16.31***
	(1.66)	(1.82)	(4.08)	(4.13)
CONSTANT	500	331	1152	1983*
	(480)	(528)	(1181)	(1197)
# OBSERVATIONS	371	371	371	371
R^2	.98	.97	.08	.28

Dependent variable in the first column is the change in each hospital's Medicaid revenue. Specifically, it equals $MCAIDREV_{9295} - MCAIDREV_{90}$, with $MCAIDREV_{9295}$ equal to average Medicaid revenue in the 1992–1995 time period. The dependent variables in the other columns (change in local government subsidies, change in other revenues, and change in total revenues) are defined similarly. DSH represents the average funds from the Disproportionate Share Program from 1992–1995. Sample includes the 371 hospitals in operation in California from 1987 to 1995 that reported revenue information in all years. Dollar amounts (in thousands) are inflation-adjusted to 1990 dollars. Standard errors are included in parentheses.

hospital's type of ownership in running the following specification:

$$\begin{aligned}(2)\quad \Delta REVENUES_j = {} & \alpha + \beta_1 * DSH_j \\ & + \beta_2 * (DSH_j * FOR\text{-}PROFIT_j) \\ & + \beta_3 * (DSH_j * PUBLIC_j) \\ & + \mu_1 * FOR\text{-}PROFIT_j \\ & + \mu_2 * PUBLIC_j + \lambda * BEDS_j + \epsilon_j.\end{aligned}$$

In Table VIII, I present the results from several OLS specifications of this type. Each column has a different dependent variable. The sum of the dependent variables in the first three specifications (changes in Medicaid revenues, subsidies, and other revenues) is equal to the dependent variable in the fourth, which is the change in total hospital revenues.

The first column reveals that for-profit, not-for-profit, and government-owned hospitals that received DSH funds between

1992 and 1995 all witnessed significant increases in their total Medicaid revenues. There are two reasons that, in all three cases, the estimates are greater than one. First, hospitals that qualified for DSH were also being affected by the Medicaid eligibility expansions. A greater fraction of their patients, even without any reallocation across hospitals, were insured by this government program. Second, hospitals that qualified for DSH were relatively successful in attracting additional Medicaid patients. This was especially true for private hospitals, as the results in the previous section demonstrated. The Medicaid revenues of qualifying hospitals should therefore have increased by more than their DSH funds alone would imply.

The dependent variable in the second specification is the change in local government subsidies, ΔSUBSIDIES.[15] As the significantly negative estimate of −1.04 on the (DSH * PUBLIC) variable shows, those public hospitals that qualified for DSH experienced substantial declines in their subsidies. The estimate actually suggests that local governments took all of the DSH funds from public hospitals by reducing their subsidies one-for-one. This result provides strong support for the soft budget constraint theory of government-owned institutions. Because private hospitals received virtually no subsidies from local governments, it is not surprising that the coefficient estimates on the other two DSH coefficients are insignificantly different from zero.

The next column uses as its dependent variable the change in all other revenues, ΔOTHER REV. The point estimate on the DSH coefficient is significantly negative, suggesting that not-for-profit hospitals reduced their care to other types of patients to increase the number of Medicaid patients that they served.[16] There is no such significant relationship between DSH funds and other revenues for the other two hospital types.

The dependent variable in the fourth specification, ΔREVENUES, is the sum of the dependent variables in the first four columns. Both types of private hospitals experienced significant increases in their revenues, as the coefficients on the DSH and

15. Prior to the creation of DSH, county subsidies accounted for approximately 30 percent of the revenues of those public hospitals that qualified for DSH.

16. It is worth noting that average occupancy rates were greater in private not-for-profit hospitals than in the other two types of facilities. Thus, it is plausible that private not-for-profit hospitals had to reduce care to other types of patients to attract sufficient Medicaid patients, while for-profit facilities had sufficient excess capacity to avoid doing this. Additionally, Medicaid expansions crowded out some private insurance coverage, suggesting that revenues from private sources would fall somewhat as Medicaid revenues increased.

(DSH * FOR-PROFIT) coefficients show. Because of the crowd-out of intergovernmental funds, safety-net hospitals that qualified for DSH had no significant increase in their revenues.

The results in this section show that local governments took the DSH funds that were given to publicly owned hospitals, leaving these facilities with no additional revenues. This result supports the theory that organizations owned by the government do have a soft budget constraint. The next section tests whether the decision-makers in private not-for-profit hospitals are more altruistic than their profit-maximizing counterparts by examining how private hospitals used their cash windfalls.

B. Are Not-for-Profit Hospitals More Altruistic than Profit-Maximizing Firms?

If the decision-makers in private not-for-profit hospitals value the welfare of their patients significantly more than do the managers in profit-maximizing firms, then these two types of hospitals should behave quite differently in response to an exogenous increase in their revenues. For example, an altruistic hospital administrator could have used their DSH funds to provide more medical care to their indigent patients. Profit-maximizing firms would only have done this if it was financially attractive to do so. To test whether not-for-profit managers are more altruistic than for-profit ones, I examine in this section how these two types of private hospitals used the increased revenues that they received from the DSH program.[17]

I first explore the effect of the cash windfalls on total hospital costs. Table IX provides the results of regressions that explain changes in hospital revenues, costs, and profits as a function of their total DSH funds received. The second column reveals that, for all three types of hospitals, changes in hospital costs, ΔCOSTS, were not significantly related to revenues received from the DSH program. Additionally, there is no significant difference between the implied effect of DSH funds on hospital costs for the private not-for-profit and for-profit facilities. Given that local governments took most of the DSH funds from public hospitals, it is not surprising that costs did not increase with additional DSH funds at these medical care providers.

17. Because local governments took the DSH funds intended for public hospitals, I am unable to perform a similar test regarding the preferences of the public hospital decision-makers.

TABLE IX
IMPACT OF DSH FUNDS ON HOSPITAL PROFITS

	Δ REVENUES	Δ COSTS	Δ NET INCOME
DSH	1.15***	−.01	1.16***
	(.22)	(.20)	(.10)
DSH * PUBLIC	−1.03***	.13	−1.16***
	(.22)	(.20)	(.10)
DSH * FOR-PROFIT	.52	.37	.15
	(.94)	(.86)	(.44)
PUBLIC	1204	1855	−650
	(1472)	(1361)	(693)
FOR-PROFIT	−3907***	−3864***	−43
	(1373)	(1268)	(646)
$BEDS_{90}$	16.31***	20.32***	−4.02**
	(4.13)	(3.82)	(1.95)
CONSTANT	1983	1373	609
	(1197)	(1106)	(563)
# OBSERVATIONS	371	371	371
R^2	.28	.29	.28

Dependent variable in the first column is $REVENUES_{9295}$ − $REVENUES_{90}$, with $REVENUES_{9295}$ equal to the average revenue in the 1992–1995 time period. The dependent variables in the other columns (the change in total costs and the change in net income) are defined similarly. DSH represents average funds from the Disproportionate Share Program from 1992–1995. Sample includes the 371 hospitals in operation in California from 1987 to 1995 that reported revenue information in all years. Dollar amounts (in thousands) are inflation-adjusted to 1990 dollars. Standard errors are included in parentheses.

The third column summarizes the results with changes in hospital profits, ΔNET INCOME, as the dependent variable. The significant estimate of 1.16 on the DSH coefficient suggests that not-for-profit hospitals' net income increased approximately one-for-one with their DSH payments. This effect is not significantly different from the corresponding effect on the profits of for-profit hospitals, as the insignificant estimate of 0.15 on the (DSH * FOR-PROFIT) coefficient shows. DSH funds did not have a significant effect on the net income of publicly owned hospitals.

Not-for-profit firms are, by law, barred from distributing cash profits to any individuals who exercise control over the firm [Hansmann 1980]. Therefore, one would expect to see increases in their accounting profits translate, essentially one-for-one, into increases in their net worth (total assets minus total liabilities). This would be the case if a hospital used its profits to invest in new equipment, pay off long-term debt, or invest in the stock market. For-profit hospitals could have retained the funds within the facility, but were also free to repatriate the profits to the parent

TABLE X
IMPACT OF DSH FUNDS ON HOSPITAL NET WORTH

	Δ NET WORTH	Δ NET PPE	Δ NET FIN ASSETS
DSHSUM	.85***	.01	.85***
	(.12)	(.08)	(.12)
DSHSUM * PUBLIC	−.92***	−.01	−.91***
	(.12)	(.08)	(.12)
DSHSUM * FOR-PROFIT	.15	−.16	.31
	(.53)	(.35)	(.52)
PUBLIC	4596	6295***	−1700
	(3345)	(2226)	(3246)
FOR-PROFIT	2925	359	2566
	(3118)	(2075)	(3025)
$BEDS_{90}$	37.27***	18.74***	18.52**
	(9.39)	(6.25)	(9.11)
CONSTANT	−3707	−2208	−1498
	(2720)	(1810)	(2639)
# OBS	371	371	371
R^2	.199	.051	.212

Dependent variable in the first column is equal to the change in hospital net worth from 1990 to 1995. Δ NET PPE equals the change in each hospital's net property, plant, and equipment, which also includes current and planned construction. Δ NET FIN ASSETS equals the change in each hospital's net financial assets. DSHSUM represents total funds from the Disproportionate Share Program during the time period of interest. Sample includes the 371 hospitals in operation in California from 1987 to 1995 that reported revenue information in all years. Dollar amounts (in thousands) are inflation-adjusted to 1990 dollars. Standard errors are included in parentheses.

company,[18] distribute the profits to members of a partnership, or give the money to shareholders in the form of dividends. The gain in their net worth might therefore have been less than one-for-one.

In Table X I investigate the effect of DSH money on changes in hospitals' total net worth. I then divide changes in net worth into two components: changes in physical assets (net property, plant, and equipment + current and planned construction) and changes in net financial assets (the difference between net worth and physical assets). The first column shows estimates of the effect of *total* DSH funds, DSHSUM, on the change in hospital net worth, ΔNET WORTH.

The results in the first column reveal that those private hospitals that qualified for DSH funds experienced significant increases in net worth during the time period of interest. The coefficient estimates suggest that, for every $100 received in DSH

18. If the hospital is part of a corporation.

funds from 1992 through 1995, not-for-profit hospitals' net worth increased by $85 while for-profits' increased by $100. In both cases, the coefficient estimates are significantly different from zero and insignificantly different from one. Furthermore, the two estimates are not significantly different from one another. As one would expect, public hospitals did not enjoy a significant increase in their net worth. The results for this specification imply that both types of private hospitals kept their cash windfalls inside the firm.[19]

The second and third columns of Table X reveal that private for-profit and not-for-profit hospitals used their cash windfalls quite similarly. In the second column I explain changes in hospitals' total physical assets, ΔNET PPE, since the introduction of DSH.[20] The statistically insignificant estimates on the DSHSUM and (DSHSUM * FOR-PROFIT) coefficients indicate that neither type of private hospital used their DSH funds to finance purchases of new equipment or begin new construction. Once again, the estimated effects for not-for-profit and for-profit hospitals are not significantly different from one another.

As the estimates on the DSHSUM and (DSHSUM * FOR-PROFIT) coefficients in the third specification show, both not-for-profit and for-profit hospitals used most of their cash windfalls to increase their holdings of financial assets. The significant estimates are insignificantly different from one another, and one cannot reject the hypothesis that all of the DSH funds received by private hospitals were used to increase the facilities' financial assets. Thus, the observable response of not-for-profit and for-profit hospitals to exogenous increases in their revenues was quite similar.

The increase in net worth for private hospitals that qualified for DSH was substantial. From 1985 to 1990 the total net worth of these organizations remained steady at approximately 500 million dollars. From 1990 to 1995 their net worth rose to nearly 1.10 billion dollars. DSH funds apparently accounted for virtually all of this increase, as these facilities received 600 million dollars in DSH payments during this time period.

The results presented in this section do not support the

19. The result for private for-profit hospitals is broadly consistent with the results of Blanchard, Lopez-de-Silanes, and Shleifer [1994]. These authors found that investor-owned firms in other industries that received cash windfalls did not distribute the funds to shareholders.

20. This measure of property, plant, and equipment also includes any current or planned construction.

hypothesis that the decision-makers in private not-for-profit hospitals have motives that are much different from the motives of their for-profit counterparts. Not-for-profit hospitals were no more likely to use their DSH funds to improve medical care quality for the poor, as profits increased one-for-one with the cash windfalls that they received. Rather than using these profits to invest in new property, plant, and equipment, not-for-profit hospitals simply increased their holdings of financial assets.

This is consistent with the results from the previous section, which showed that both types of private firms increased their provision of care to the newly profitable Medicaid patients while reducing their care to the unprofitable patients without health insurance. These results lead me to reject the theory that the decision-makers in private not-for-profit hospitals are more altruistic than are the managers in profit-maximizing firms.

VI. The Impact on Health Outcomes

Despite the lack of evidence for any effect of DSH funds on inputs to health care production, the change in hospital behavior caused by the DSH program may have affected health outcomes. Private hospitals that admitted more indigent patients after the introduction of DSH may have offered better medical care than government-owned facilities. Alternatively, the increased competition from private firms may have spurred public hospitals to improve the quality of their services.[21]

In this section I examine whether health outcomes improved more in those places where the most reallocation of Medicaid patients from public to private hospitals occurred. Rather than examining health outcomes for all indigent patients, I focus solely on infant mortality rates. There are three reasons for doing this. First, newborn infants are, by a significant margin, the most common type of Medicaid-insured hospital patient, with births accounting for more than 60 percent of all Medicaid discharges.[22] Second, Medicaid-insured newborns were more likely than other Medicaid patients to be reallocated from public to private hospi-

21. Hoxby [1994] finds that competition from private schools does lead to improved performance by public schools. Kessler and McClellan [2000] find that increases in hospital competition are associated with improved outcomes for Medicare heart attack patients.

22. There were 814,056 Medicaid discharges in 1990. Of these, more than 500,000 were pregnancy-related (approximately half of these were newborn infants with the rest being the mothers who delivered the children).

tals.[23] Third, previous work has shown that infant mortality rates are particularly sensitive to changes in health care quality [Currie and Gruber 1996]. Newborn infants are therefore the group whose health outcomes would most likely have been affected by hospitals' responses to the DSH program.

In the analysis that follows, I use data on infant mortality rates within each zip code[24] in California in 1990 and 1995, and combine this with the hospital patient data used above to run specifications of the following form:

$$(3)\quad \Delta MORT_{jt} = \alpha + \beta \Delta MCPRIV_{jt} + \lambda \Delta MORT_{j,t-1} + \mu \Delta MCAID_{jt} + \Theta \Delta LBW_{jt} + \gamma \Delta X_{jt} + \epsilon_{jt}.$$

In this equation, $\Delta MORT_{jt}$ measures the change in the infant mortality rate in zip code j from 1990 to 1995. $\Delta MCAID_{jt}$ equals the change in the percentage of infants who were insured by the Medicaid program within zip code j, and $\Delta MCPRIV_{jt}$ is the change in the number of Medicaid newborns attending private facilities as a percentage of all babies born in that zip code.[25] Both $\Delta MCAID_{jt}$ and $\Delta MCPRIV_{jt}$ are included to disentangle the effects of expansions in Medicaid eligibility from the reallocation of Medicaid patients from public to private hospitals. Additional explanatory variables control for each zip code's preexisting infant mortality rate trend ($\Delta MORT_{j,t-1}$), the change in the percentage of babies born at low-birthweight[26] (ΔLBW_{jt}), and for changes in the demographic characteristics of infants and their mothers. Summary statistics for these variables are provided in Table XI.

In the first three columns of Table XII, I present results for specifications that explain changes in infant-mortality rates as a function of the explanatory variables described above. The first column reveals that places in which a substantial number of

23. The share of Medicaid-insured infants born in private hospitals rose from 57 percent in 1990 to 75 percent in 1995. The corresponding shares for other Medicaid patients (excluding women who delivered the babies) were 61 percent and 67 percent.

24. The zip code is the patient's zip code of residence. The data on mortality include all infant deaths—not only those occurring in a hospital. The mortality data do not include information about the insurance status of the deceased. I am therefore unable to construct Medicaid-specific mortality rates using these data. I can construct Medicaid-specific infant mortality rates for those deaths that occur inside of the hospital (approximately two-thirds of all infant deaths). The results reported below are quite similar if I use this measure instead.

25. My results are similar if I define the reallocation measure to be the change in the fraction of all newborns attending private facilities.

26. Low-birthweight babies have a relatively high mortality rate—7.51 percent in 1990 versus 0.39 percent for other infants.

TABLE XI
SUMMARY STATISTICS FOR CHANGES IN INFANT MORTALITY RATES AT ZIP-CODE LEVEL

Variable	# Obs	Mean	Std. dev.
Δ MORTALITY$_{95,90}$	1382	−0.16%	0.71%
Δ MCPRIV$_{95,90}$	1382	14.29%	10.29%
DSHPER$_{91}$	1382	4.116	3.266
Δ MORTALITY$_{90,89}$	1382	−0.08%	0.84%
Δ LBW$_{95,90}$	1382	0.38%	1.90%
Δ MEDICAID$_{95,90}$	1382	9.15%	6.51%
Δ AGE $<25_{95,90}$	1382	−0.79%	3.98%
Δ AGE $>34_{95,90}$	1382	2.66%	2.98%
Δ HISPANIC$_{95,90}$	1382	5.11%	5.40%
Δ BLACK$_{95,90}$	1382	−0.14%	2.56%

Sample includes the 1382 CA zip codes with at least one birth in both 1990 and in 1995 and with 1990 census information.

Medicaid newborns were reallocated from public to private hospitals did not have significantly different changes in infant mortality during the five-year time period of interest. Infant mortality rates fell by an average of 0.16 percent during this time period (from 0.75 percent to 0.59 percent), but this reduction was not significantly associated with the reallocation of Medicaid patients from public to private hospitals.

This result is not affected by the inclusion of three additional explanatory variables in the second specification. The significantly positive estimate on the ΔLBW_{jt} coefficient has the expected sign—low-birthweight babies have a much greater mortality rate than do other infants. The significant estimate of −0.3928 on $\Delta MORT_{j,t-1}$ reveals that counties with large reductions in infant mortality from 1989 to 1990 had smaller reductions during the next five years, which is presumably capturing regression to an area's infant mortality rate trend. Areas in which Medicaid eligibility was expanding most rapidly did not have greater declines in infant mortality than did other areas, as the insignificant estimate on the $\Delta MCAID_{jt}$ coefficient shows. The third specification includes controls for changes in the demographic characteristics of infants and their mothers, and the results remain essentially unchanged.

One potential problem with the ΔMCPRIV measure is that the shift of Medicaid patients from public to private hospitals may have been influenced by factors other than the DSH financial

TABLE XII
IMPACT OF REALLOCATION ON CHANGES IN INFANT MORTALITY RATES

	Δ MORTALITY$_{95,90}$				
	(1)	(2)	(3)	(4)	(5)
Δ MCPRIV$_{95,90}$	.0000	−.0005	.0005		
	(.0019)	(.0020)	(.0021)		
DSHPER$_{91}$				−2.4E-4	1.5E-3
				(5.8E-3)	(5.3E-3)
Δ MORTALITY$_{90,89}$		−.3928***	−.3948***		−.3948***
		(.0198)	(.0199)		(.0199)
Δ MEDICAID$_{95,90}$		.0030	.0026		.0030
		(.0031)	(.0036)		(.0029)
Δ LBW$_{95,90}$		.0358***	.0334***		.0332***
		(.0089)	(.0089)		(.0089)
Δ HISPANIC$_{95,90}$			−.0044		−.0044
			(.0034)		(.0033)
Δ BLACK$_{95,90}$			.0116*		.0116*
			(.0069)		(.0069)
Δ AGE <25$_{95,90}$			.0042		.0043
			(.0046)		(.0046)
Δ AGE >34$_{95,90}$			.0045		.0044
			(.0061)		(.0060)
CONSTANT	−.16***	−.23***	−.22***		−.22***
	(.03)	(.03)	(.04)		(.04)
# OBSERVATIONS	1382	1382	1382	1382	1382
R^2	.0000	.2316	.2350	.0000	.2350

The dependent variable equals the change in the infant mortality rate in the zip code from 1990–1995. ΔMCPRIV$_{95,90}$ is the change in the number of Medicaid newborns attending private facilities as a percentage of all newborns. DSHPER$_{91}$ is the average DSH dollars (in thousands) per Medicaid newborn in the zip code (described further in Section VI). ΔMORTALITY$_{90,89}$ is the change in the infant mortality rate from 1989 to 1990, and ΔMEDICAID$_{95,90}$ equals the change in the percentage of newborns who are Medicaid-eligible. ΔLBW$_{95,90}$ is the change in the percentage of infants born weighing less than 2500 grams. ΔHISPANIC$_{95,90}$ and ΔBLACK$_{95,90}$ represent the change in the percentage of newborns who are Hispanic and black, respectively. ΔAGE <25$_{95,90}$ and ΔAGE >34$_{95,90}$ equal the change in the percentage of women delivering newborns who are younger than 25 and older than 34, respectively. Standard errors are included in parentheses.

incentives. An alternative measure would examine whether areas that received substantial funds from DSH in the first year of the program had significantly better improvements in health outcomes than did other areas. To construct such a measure, I calculate the average DSH funds received per Medicaid newborn within each zip code, assigning an amount (D_j/M_j) to each newborn delivered at hospital j. Here D_j equals total DSH funds (in thousands of dollars) received by the hospital in the first year of the program, and M_j is the number of Medicaid patients

admitted to hospital j.[27] Therefore, zip codes that are served primarily by qualifying hospitals will have a relatively high value for this $DSHPER_{91}$ measure. Specifications four and five reveal that infants living in zip codes served primarily by qualifying hospitals did not have better improvements in health outcomes than did other places.[28] The coefficients for the other explanatory variables are virtually unchanged from the corresponding specification for $\Delta MCPRIV$ in column (3).

These findings suggest that health outcomes for low-income individuals did not improve despite a substantial increase in public medical spending for the indigent. Medicaid patients did presumably derive some utility gain from the increased access to private facilities, and I cannot rule out improvements in outcomes for other Medicaid patients. But for the reasons listed above, Medicaid-insured newborns would have been more likely than any other group to benefit from DSH. If California's experience is representative of the United States as a whole, then the social benefit from this $20 billion increase in public medical spending has been much smaller than its cost.

VII. Conclusion

In this paper I exploit a plausibly exogenous change in hospital financing to test three theories of organizational behavior. I reject the theory that the nondistribution constraint on private not-for-profit hospitals leads these organizations to be less responsive to financial incentives than their profit-maximizing counterparts. I also reject the theory that the decision-makers in not-for-profit firms are more altruistic than the managers in for-profit firms, as not-for-profit hospitals are no more inclined than profit-maximizing facilities to use cash windfalls to improve medical care quality for the poor.

Instead, my results reveal that the critical difference between private for-profit, private not-for-profit, and publicly owned firms in the hospital industry is caused by the soft budget constraint of government-owned institutions. Public hospitals were unrespon-

27. Suppose that 30 Medicaid infants from zip code Z are delivered at hospital A, and that 70 are delivered at hospital B. If hospital A received $500,000 in DSH funds and had 500 total Medicaid discharges, and hospital B did not qualify, then $DSHPER_{91}$ for this zip code would equal $300 (.3 * 1000 + .7 * 0).

28. The results are similar if I define $DSHPER_{91}$ to be DSH funds per infant (rather than per Medicaid infant).

sive to financial incentives because any increases in their revenues were taken by the local governments that own them. Because every dollar of DSH funds crowded out one dollar of government subsidies, none of the billions of dollars received by public hospitals resulted in improved medical care quality for the poor.

In the final section of the paper, I explore whether the reallocation of Medicaid patients from public to private hospitals caused by the DSH program improved health outcomes for the poor. I find that areas in which substantial reallocation occurred did not have better improvements in health outcomes, as measured by changes in infant mortality.

Taken together, my findings suggest that programs that aim to improve medical care for the poor must be much more carefully designed if they are to benefit the indigent. This result may have implications for other sectors (e.g., education, child care, prisons) in which more than one level of government is involved in the financing of services, and in which public and private firms coexist.

APPENDIX

Calculating the Predicted Change in Medicaid and Uninsured Admissions at Each Hospital

Hospitals are indexed by $j = 1, \ldots, J$. Cells are indexed by $k = 1, \ldots, K$. Each patient i is included in cell k depending on his/her race (white, black, Hispanic, other) and zip code of residence. Because there are nearly 2000 zip codes in California, the number of cells in each year is approximately 7000 ($K = 7000$). Using 0 as a base year, define for each hospital j the share of Medicaid patients within cell k:

$$s_{jk0} = \frac{n_{jk0}}{\sum_{j=1}^{J} n_{jk0}},$$

in which n_{jkt} equals the number of Medicaid-insured hospital patients from cell k admitted to hospital j in year 0. The predicted number of Medicaid patients at hospital j (using 0 as the base year) in year $t > 0$ is defined to be

$$mcpred_{jt} = \sum_{k=1}^{K} s_{jk0} * n_{kt}.$$

This measure will therefore control for changes in the probability that a patient in cell k is Medicaid-insured and for changes in the number of patients within cell k. All else equal, hospitals that in the base year served patients from cells in which Medicaid eligibility was subsequently expanding will have predicted increases. Similarly, if a hospital serves patients residing in areas where the population subsequently declines, they will (all else equal) have predicted decreases. The predicted number of uninsured patients for each hospital is constructed in an analogous manner.

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