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HOSPITAL OWNERSHIP AND PUBLIC MEDICAL SPENDING

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ABSTRACT

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. My results reveal that the critical difference between the three types of hospitals owes to 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 did not improve health outcomes for the indigent.

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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 intended 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 outcomes of these policies. This is likely to be especially true in the medical sector, in which the federal, state, and local governments contract directly 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 response 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]. If both types of firms use their profits to increase firm perquisites, while for-profit organizations instead increase cash compensation, one would expect profit-maximizing firms to be more responsive than either public or private not-for-profit organizations to a change in financial incentives.

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] or that they deviate from profit-maximizing behavior [Lakdawalla-Philipson 1998]. Employees in government-owned institutions may have a strong sense of mission [Wilson 1989] and behave so as to maximize the well-being of the individuals most affected by their organization. If the decision-makers in not-for-profit and government-owned hospitals have more altruistic motives than their counterparts in for-profit organizations, then these firms will be more inclined to deviate from profit-maximizing behavior in response to a change in government policy.

A third theory of organizational behavior predicts that public firms differ substantially from all 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 softer 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 would lead public hospitals to be relatively insensitive to changes in the profitability of patients, and prevent them from using exogenous increases in their revenues to increase their provision of care to the poor. Private firms would be more responsive to changes in incentives, and would be more likely to retain profits inside of the firm.

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 those 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 non-linear 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 are significantly more responsive to the DSH incentives than are public facilities. After the change in government policy, private for-profit and not-for-profit hospitals cream-skim the most profitable indigent patients from public facilities while continuing to avoid the unprofitable ones. Their observable response is quite similar, while public hospitals are quite unresponsive to the change in incentives. This result leads me to reject the first hypothesis, which argues that the non-distribution constraint on private not-for-profit hospitals causes them to 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 that they received after the introduction of the DSH program. My findings reveal that local governments reduced their subsidies to public hospitals by approximately $100 for every $100 in DSH funds received, so that these hospitals are left without benefit. Private for-profit and not-for-profit hospitals use 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 behave much differently from private ones when their financial incentives change or their revenues increase because they do 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 organizational behavior on health outcomes. Because public hospitals have received none of the DSH funds intended for them and private firms have used their funds primarily to increase their holdings of financial assets, the large increase in public medical spending has not led to a significant increase in medical care inputs. Despite this, the reallocation of patients 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 greater improvements in health outcomes, as measured by changes in zipcode-level 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 ease with which an institution's decision makers can appropriate profits is the critical difference between private for-profit, private not-for-profit, and government-owned firms. 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.[1] Instead of keeping the profits, the not-for-profit decision maker will use them to increase firm perquisites, which are less valuable than cash.

If this theory is true, and if manager effort is costly, then one would expect a for-profit firm

[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% of all non-volunteer labor in not-for-profit firms.

to be more responsive to a new profitable opportunity than would a not-for-profit firm. Patients who are, on the margin, just profitable enough to offset a for-profit manager's effort costs, will not be attractive to a not-for-profit decision maker. This theory does not imply, however, that not-for-profit firms will be unresponsive to a change in incentives, but simply that profit-maximizing firms will be somewhat more responsive. The difference in responsiveness will be greater as effort costs become a more important factor.

This theory also claims that a profit-maximizing organization will be more responsive to a change in incentives than will a government-owned firm, but does not make a strong prediction about the difference between the not-for-profit and public firms' responsiveness.

B. Altruistic Decision-Makers

An alternative explanation for the difference between private for-profit, private not-for-profit, and government-owned firms is that the people who choose to work at not-for-profit and government-owned firms have different preferences from the employees in profit-maximizing firms.[2] Previous work on not-for-profit firms has emphasized the altruistic nature of their decision-makers [Rose-Ackerman 1996] or that these individuals deviate from profit-maximizing behavior [Lakdawalla-Philipson 1998].[3] Wilson [1989] provides several examples of government employees who value the well-being of the people served by their agencies.

If the decision-makers in private not-for-profit and government-owned organizations have motives that are different from the motives of managers in profit-maximizing firms, then one would expect these firms to behave quite differently in response to an exogenous increase in their profits. For example, a not-for-profit or government-owned hospital that valued the well-being of indigent

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

[3]Work by Newhouse [1970] and Feldstein [1973] 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.

patients more than a profit-maximizing firm should use some of the windfall to provide more medical care for these individuals.

As was true for the previous theory, this one 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 should simply be more willing to deviate from profit-maximizing behavior than the individuals in private for-profit firms.

C. Soft Budget Constraint

Unlike the previous two, the final theory emphasizes the differences between 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.[4] If this were true, then government-owned hospitals would be significantly less responsive to a change in incentives than would a private facility.

This theory focuses on differences in the legal rights between public and private firms, and predicts that exogenous increases in the revenues of public firms should 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 thus their behavior 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 non-elderly individuals with family incomes below the poverty line received public health

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

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 non-elderly individuals with family income greater than twice the poverty line were 2 percent and 9 percent [EBRI, 1991]. Thus the nine million Californians who were either Medicaid-insured or uninsured in 1990 were disproportionately poor.

Hospitals provide 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.[5] Estimates suggest that hospital Medicaid revenues covered only 80 percent of the costs of treating those patients in 1990. Uninsured patients were even less profitable for hospitals to treat, because they were typically unable to pay for their medical care. Therefore, the average costs of caring for the indigent exceeded the payments that hospitals received to treat them. Many hospitals used profits from non-indigent patients to cross-subsidize medical care for the poor [Aaron 1991]. Those 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. After this change, 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, et al 1992].

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[5]Starting in 1988, 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.

This federal legislation led, in late 1990, to the creation of California's DSH program. 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. This number measured 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. Figure I shows the relationship between the DSH per-diem and the low-income number for a private non-teaching hospital. This rate increases non-linearly from $240 to a maximum of $1052.[6]

The DSH program had two effects. First, it significantly raised the revenues of those hospitals that were already above the 25 percent notch. Second, it increased 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 notch with an average number of Medicaid days would receive $3 million if it qualified in the following year. Additionally, the marginal revenue of a Medicaid patient for hospitals above the threshold increased by 40 percent or more.

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 would have been much more financially attractive, because the hospital would receive 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

[6]Prior to DSH, average Medicaid per-diem rates were $630. Thus qualifying hospitals enjoyed a substantial increase in their effective Medicaid per-diem.

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 hospital-level data provides 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. Since this program was first implemented in 1990, public hospitals have 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 reflects 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.

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 have increased their DSH payments more than

[7]Approximately 7 percent of the hospitals in the sample convert to a different ownership type between 1987 and 1995. The most common conversions are non-profit to for-profit (10), for-profit to non-profit (9), and public to non-profit (6).

threefold within five years, while public hospitals' DSH funds have declined substantially.

These data strongly suggest that both types of private hospitals have responded more aggressively to the change in incentives than have 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 financial incentives because of their non-distribution 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 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

[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 incomes close to or below the poverty line were insured by this program. By 1993, eligibility had been extended to all women 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.

Medicaid eligibility, it is important to control for this potentially confounding factor when examining the behavioral response of hospitals to the DSH financial incentives. A hospital may appear to be responding to the DSH incentives when it has more Medicaid admissions simply because a greater fraction of its pre-DSH patients are now eligible for Medicaid.

To control for the effect of the eligibility expansions on each hospital's patient mix, I use patient demographic and zipcode 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 zipcodes in the base year would have relatively small predicted Medicaid numbers. Alternatively, those hospitals that served patients from areas that were disproportionately affected by the expansions will 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, $\Delta MCAID_{95,90}$ and $\Delta UNINS_{95,90}$. Summary statistics for these variables are provided in Table IV.

Columns one and three 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

[10]The construction of this estimated measure is described in the appendix.

specification shows that Medicaid patients were not being reallocated nearly as much[11] prior to 1990.

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 lower 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. 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 non-distribution 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 is a response to the DSH financial incentives or is instead due to 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 qualify 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 hosptials above the notch. If DSH is indeed the cause

[11]Unlike the estimate for the $\Delta UNINS_{95,90}$ 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. Despite this, it is clear that the predicted change in Medicaid patients has much more predictive power from 1985-90 than during the 1990-95 period. This is consistent with the view that competition for Medicaid patients intensified after 1990.

of the reallocation of Medicaid patients described above, then one would expect hospitals above this notch or slightly below it to admit 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:

$$(1)\ MCAID_{jt} = \alpha_j + \lambda_t + \beta_0 BEDS_{jt} + \beta_1 MCPRED_{jt} + \beta_2 OBSTET_{jt} + \beta_3 OWN_{jt} + \beta_4 LOW>15_{j,t-1}$$
$$+ \beta_5 DSH_t * OWN_{jt} + \beta_6 DSH_t * LOW>15_{j,t-1} + \beta_7 DSH_t * LOW>15_{j,t-1} * OWN_{jt} + \varepsilon_{jt}$$

Here $MCAID_{j,t}$ 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 takes on a value of one if a hospital's low-income number is greater than 15 percent.[12] DSH*LOW>15 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 are 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 are differentially affecting each of the three types of hospitals in the post-DSH period. $MCPRED_{j,t}$ 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 specification I introduce the explanatory variables described above. As the coefficients on the DSH * LOW>15 coefficients

[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.

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-1} * $LOW>15_{t-1}$ 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 is 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 are similarly responsive to the change in incentives, and both are significantly more responsive than are government-owned institutions. Based on these results, I reject the theory that not-for-profit hospitals are less responsive to financial incentives than profit-maximizing firms. Instead, I find that public hospitals are much less responsive to financial incentives than are privately-owned organizations, providing preliminary support for the soft budget constraint theory of government-owned institutions.

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 total revenues after the introduction of DSH.

The soft budget constraint theory described above implies that local governments would take the cash windfalls received by public hospitals. The altruism theory predicts that decision-makers in private not-for-profit firms would be more inclined than profit-maximizing managers to use their

cash windfalls to improve the quality of 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 revenues.[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 hospital's type of ownership in running the following specification:

$$(2)\ \Delta REVENUES_j = \alpha + \beta_1 * DSH_j + \beta_2 * (DSH_j * FOR-PROFIT_j) + \beta_3 * (DSH_j * PUBLIC_j) + \mu_1 * FOR-PROFIT_j + \mu_2 * PUBLIC_j + \lambda * BEDS_j + \varepsilon_j$$

In Table VIII, I present the result 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

[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.

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 are also being affected by the Medicaid eligibility expansions. A greater fraction of their patients, even without any reallocation across hospitals, will be insured by this government program. Second, hospitals that qualified for DSH were relatively successful in attracting additional Medicaid patients. This is especially true for private hospitals, as the results in the previous section suggested. Thus one would expect qualifying hospitals to have greater increases in Medicaid revenue during this time period than their DSH funds alone would imply.

The dependent variable in the second specification is the change in local government subsidies, Δ SUBSIDIES.[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, Δ OTHER REV. The point estimate on the DSH coefficient is significantly negative, suggesting that not-for-profit hospitals may have reduced their care to other types of patients in order to increase the number

[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.

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, Δ REVENUES, 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 (DSH * FOR-Π) coefficients show. Because of the crowdout 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 have taken most of the DSH funds that were given to publicly-owned hospitals, leaving these facilities with no significant increase in revenues. This result supports the theory that hospitals owned by the government do have a soft budget constraint. The next section tests whether the decision-makers in private not-for-profit firms are more altruistic than their profit-maximizing counterparts by comparing their use of 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 more than do the managers in profit-maximizing firms, then one would expect these institutions to behave quite differently from for-profit facilities in response to an exogenous increase in their revenues. An altruistic hospital administrator could, for example, use these funds to provide more medical care to their indigent patients. Profit-maximizing firms would only do this if it was financially attractive to do so. To test whether not-for-profit managers are more altruistic than for-

[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.

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, are 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 have taken most of the DSH funds from public hospitals, it is not surprising that costs have not increased with additional DSH funds at these medical care providers.

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 has increased approximately one-for-one with the increases in their revenues. The effect of DSH funds on these facilities' profits are 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 that 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 may retain the

[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.

funds within the facility, but are also free to repatriate the profits to the parent company,[18] distribute the profits to members of a partnership, or give the money to shareholders in the form of dividends. The gain in for-profit hospitals' net worth might therefore be 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 and current construction) and changes in net financial assets (net worth - physical assets). The first column shows estimates of the effect of *total* DSH funds, DSHSUM,[19] 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 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 do not witness a significant increase in their net worth. The results for this first specification imply that both types of private hospitals have retained their cash windfalls inside of the firm.[20]

The second and third columns of Table X reveal that private for-profit and not-for-profit hospitals have used their cash windfalls quite similarly. In the second column, I explain changes in

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[18]If the hospital is part of a corporation.

[19]I use total DSH funds because here I am explaining a stock rather than a flow.

[20]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.

hospitals' total physical assets, ΔNETPPE, since the introduction of DSH.[21] The statistically insignificant estimates on the DSHSUM and (DSHSUM * FOR-PROFIT) coefficients indicate that neither type of private hospitals used their increased revenues 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-Π) coefficients in the third specification show, both not-for-profit and for-profit hospitals have 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 have been 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 is quite similar.

The increase in net worth for qualifying private hospitals has been substantial. From 1985 to 1990, the total net worth of private hospitals that subsequently qualified for DSH remained steady at approximately 500 million dollars. From 1990 to 1995, their net worth rose to nearly 1.1 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 hypothesis that the decision-makers in private not-for-profit hospitals have motives that are much different from their for-profit counterparts'. Not-for-profit hospitals are no more likely to use their cash windfalls to increase expenditures on their patients' medical care, as profits increase one-for-one with the cash windfalls that they receive. Rather than using these profits to invest in new property, plant, and equipment, not-for-profit hospitals simply increase their holdings of financial assets.

This is consistent with the results from the previous section, which showed that both types

[21]This measure of PPE also includes any current or planned construction.

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 that was caused by the DSH program may have affected health outcomes. Private hospitals that admitted more indigent patients after the introduction of DSH may offer better medical care than do government-owned facilities. Alternatively, the increased competition from private firms may have spurred public hospitals to improve the quality of their services.[22]

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% of all Medicaid discharges.[23] Second, Medicaid-insured newborns were more likely than other Medicaid patients to be reallocated from public to private hospitals.[24] Third, previous work has shown that

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[22]Hoxby [1999] finds that competition from private schools does lead to improved performance by public schools. Kessler and McClellan [1999] find that increases in hospital competition are associated with improved outcomes for Medicare heart attack patients.

[23]There were 814,056 Medicaid discharges in 1990. Of these, more than 500,000 were pregnancy-related (newborn infant or the mother who delivered the child).

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

infant mortality rates are particularly sensitive to changes in health care quality [Currie and Gruber 1996]. Newborn infants would therefore be the group most likely to be affected by the reallocation from public to private hospitals caused by the DSH program.

In the analysis that follows, I use data on infant mortality rates within each zipcode[25] in California in 1990 and 1995, and combine this with the hospital patient data used above to run specifications of the following form:

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

In this equation, $\Delta MORT_{j,t}$ measures the change in the infant mortality rate in zipcode j from 1990 to 1995. $\Delta MCAID_{j,t}$ equals the change in the percentage of infants that are insured by the Medicaid program within zipcode j, and $\Delta MCPRIV_{j,t}$ is the change in the number of Medicaid newborns attending private facilities as a fraction of all babies born in that zipcode.[26] Both $\Delta MCAID_j$ and $\Delta MCPRIV_{j,t}$ are included to disentangle the effects of expansions in Medicaid eligibility from the reallocation of Medicaid patients from public to private facilities. Additional explanatory variables control for each zipcode's pre-existing infant mortality rate trend ($\Delta MORT_{j,t-1}$), the change in the percentage of babies that are born at low-birthweight[27] ($\Delta LBW_{j,t}$), and for changes in the demographic characteristics of infants and their mothers. Summary statistics for these variables are

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[25]The zipcode is the patient's zipcode of residence. The data on mortality includes all infant deaths - not only those occurring in a hospital. The mortality data does 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 2/3 of all infant deaths). The results reported below are quite similar if I use this measure instead.

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

[27]Low-birthweight babies have a relatively high mortality rate - 7.51% in 1990 versus 0.39% for other infants.

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 specification reveals that places in which a substantial number of 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% during this time period (from 0.75% to 0.59%), 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 $\Delta LBW_{j,t}$ 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 $\Delta MCAID_{j,t}$ 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 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 zipcode, 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.[28] Therefore, zipcodes 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 zipcodes served primarily by qualifying hospitals did not have better improvements in health outcomes than did other places.[29] The coefficients for the other explanatory variables are virtually unchanged from the corresponding specification for ΔMCPRIV in column three.

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 the group most likely to benefit from DSH. If California's experience is representative of the U.S. 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 non-distribution 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 are the managers in for-profit firms, as not-for-profit hospitals

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[28]Suppose that 30 Medicaid infants from zipcode 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 zipcode would equal $300 (.3 * 1000 + .7 * 0).

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

are no more inclined than their profit-maximizing counterparts to use cash windfalls to increase 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 owes to the soft budget constraint of government-owned institutions. Public hospitals are unresponsive to financial incentives because any increases in their revenues are simply taken by the local governments that own them. Because every dollar of DSH funds crowds out one dollar of government subsidies, virtually none of the billions of dollars received by these facilities results in improved medical care quality for the poor.

In the final section of the paper, I explore whether the reallocation of low-income patients from public to private hospitals has led to improved health outcomes for this group. I find that areas in which substantial reallocation occurred did not have greater improvements in health outcomes, as measured by changes in infant mortality. Taken together, my results suggest that programs to provide improved medical care to the poor must be much more carefully designed if they are to benefit this disadvantaged group.

Appendix

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

Hospitals are indexed by j = 1, . . . , J. Cells are indexed by k = 1, . . . , K. Each patient i is included in cell k depending on his/her race (white, black, Hispanic, other) and zipcode of residence. Because there are nearly 2000 zipcodes 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:

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

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 analagous manner.

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Figure I

DSH per-diem for private hospital

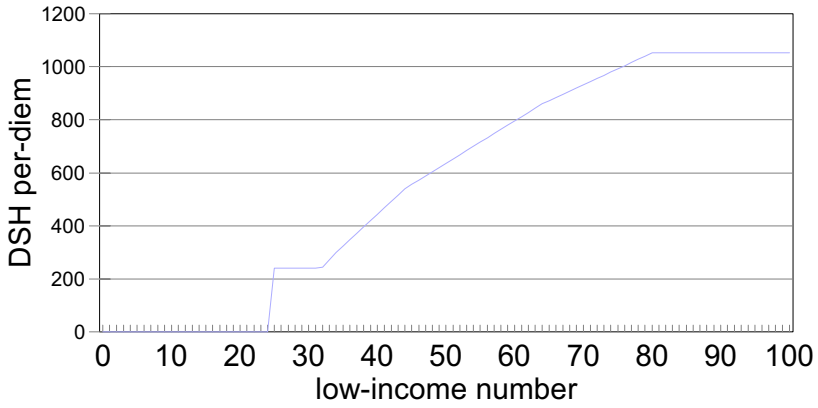

Figure II

% of patients Medicaid or Uninsured

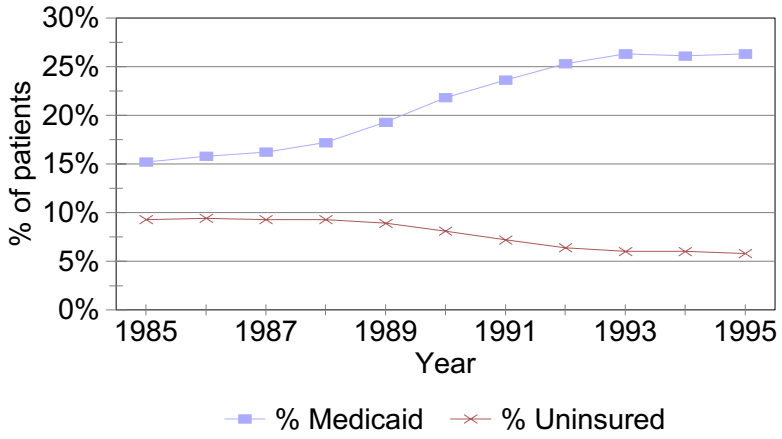

Table I
California Hospital Market: Summary Statistics in 1990

Ownership	# 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 that were Medicaid-insured and uninsured, respectively.

Table II
The Share of Medicaid and Uninsured Patients at Each Type of Hospital

	Medicaid			Uninsured		
Ownership Type	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.

Table III
Total DSH Payments by Type of Hospital

Ownership	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. FY91 payments are based on 1990 Medicaid patient days. FY 96 payments are based on 1995 Medicaid patient days.

Table IV
Summary Statistics for the Effect of DSH Financial Incentives on Hospital Behavior

Variable	# Observations	Mean	Standard Deviation
$\Delta MCAID_{95,90}$	401	342	1871
$\Delta MCPRED_{95,90}$	401	347	1049
$\Delta UNINS_{95,90}$	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
$DSH * LOW>15_{t-1}$	3171	.230	.421
$DSH * LOW>15_{t-1} * NFP_t$	3171	.087	.283
$DSH * LOW>15_{t-1} * PUBLIC_t$	3171	.090	.286
$PRIVATE\ NFP_t$	3171	.530	.499
$DSH * PRIVATE\ NFP_t$	3171	.331	.471
$PUBLIC_t$	3171	.209	.406
$DSH * PUBLIC_t$	3171	.130	.336
$BEDS_t$	3171	191	152
$OBSTETS_t$	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 1988 through 1995, and are used in the Table VI specifications.

Table V
Changes in Hospitals' Medicaid and Uninsured Admissions: 1985-1990 versus 1990-1995

	$\Delta MCAID_{95,90}$		$\Delta UNINS_{95,90}$		$\Delta MCAID_{90,85}$	
	(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 that take on a value of one if a hospital was government-owned or private-for-profit (private not-for-profit is the omitted category), and zero otherwise. $\Delta MCAID_{t+1,t}$ 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. $\Delta UNINS_{t+1,t}$ 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.

Table VI
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)
$DSH * LOW>15_{t-1}$		542***		6
		(129)		(46)
$DSH * NFP_t * LOW>15_{t-1}$		161		55
		(139)		(49)
$DSH * PUBLIC_t * LOW>15_{t-1}$		-628***		86
		(174)		(61)
$PRIVATE\ NFP_t$		-29		22
		(151)		(53)
$DSH * PRIVATE\ NFP_t$		199**		-51**
		(88)		(31)
$PUBLIC_t$		251		-101
		(231)		(82)
$DSH * PUBLIC_t$		20		28
		(136)		(48)
$BEDS_t$		3.40***		.34
		(.69)		(.25)
$OBSTETS_t$		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. $MEDICAID_{jt}$ 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 equals one for the years 1991-1995, and zero otherwise. LOW>15 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.

Table VII
Summary Statistics for the Effect 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 NETPPE	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.

Table VIII
Impact of DSH Funds on Hospital Subsidies and Revenues

	ΔMEDICAID REV	ΔSUBSIDIES	ΔOTHER REV	ΔREVENUES
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 Medicaid revenue = $MCAIDREV_{9295}$ - $MCAIDREV_{90}$, with $MCAIDREV_{9295}$ equal to the 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.

Table IX
Impact of DSH Funds on Hospital Profits

	ΔREVENUES	ΔCOSTS	ΔNET 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.

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. ΔNETPPE equals the change in each hospital's net property, plant, and equipment, which also includes current and planned construction. ΔNET 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.

Table XI
Summary Statistics for Changes in Infant Mortality Rates at Zipcode 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 zipcodes with at least one birth in both 1990 and in 1995 and with 1990 census information.

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 (.0019)	-.0005 (.0020)	.0005 (.0021)		
DSHPER$_{91}$				-2.4E-6 (5.8E-5)	1.5E-5 (5.3E-5)
Δ MORTALITY$_{90,89}$		-.3928*** (.0198)	-.3948*** (.0199)		-.3948*** (.0199)
Δ MEDICAID$_{95,90}$		.0030 (.0031)	.0026 (.0036)		.0030 (.0029)
Δ LBW$_{95,90}$		.0358*** (.0089)	.0334*** (.0089)		.0332*** (.0089)
Δ HISPANIC$_{95,90}$			-.0044 (.0034)		-.0044 (.0033)
Δ BLACK$_{95,90}$			.0116* (.0069)		.0116* (.0069)
Δ AGE<25$_{95,90}$			.0042 (.0046)		.0043 (.0046)
Δ AGE>34$_{95,90}$			.0045 (.0061)		.0044 (.0060)
CONSTANT	-.16*** (.03)	-.23*** (.03)	-.22*** (.04)		-.22*** (.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 zipcode from 1990-1995, ΔMCPRIV$_{95,90}$ is the change in the number of Medicaid newborns attending private facilities as a fraction of all newborns. DSHPER$_{91}$ is the average DSH dollars per Medicaid newborn in the zipcode (dollar amounts are in thousands and this variable is described further in section VI). ΔMORTALITY$_{90,89}$ is the change in infant mortality from 1989 to 1990, and ΔMEDICAID$_{95,90}$ equals the change in the fraction of newborns who are Medicaid-eligible. ΔLBW$_{95,90}$ is the change in the share of infants born weighing less than 2500 grams. ΔHISPANIC$_{95,90}$ and ΔBLACK$_{95,90}$ represent the change in the fraction of newborns who are Hispanic and black, respectively. ΔAGE<25$_{95,90}$ and ΔAGE>34$_{95,90}$ equal the change in the fraction of women delivering newborns who are younger than 25 and older than 34, respectively.