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Hospital Financial Conditions and the Provision of Unprofitable Services

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Abstract

Increases in hospital financial pressure resulting from public and private payment policy may substantially reduce a hospital's ability to provide certain services that are not well compensated or are frequently used by the uninsured. The objective of this study is to examine the impact of hospital financial condition on the provision of these unprofitable services for the insured and uninsured. Economic theory provides the conceptual underpinnings for the analysis, and a longitudinal empirical analysis is conducted for an eight-year study period. The results indicate that not-for-profit hospitals with strong financial performance provide more unprofitable services for the insured and uninsured than do not-for-profit hospitals with weaker condition. For-profit hospital provision of these services is not influenced by their financial condition and instead may reflect actions to meet community expectations or to offer a sufficiently broad service array to maintain the business of insured patients.

Keywords

Hospital financial condition; Unprofitable services; Insured patients; Uninsured patients

Background

Community hospitals in the US typically provide a broad array of health care services. It is generally well recognized that some of these services, especially certain surgical procedures, are well compensated relative to costs of care, whereas other services are unprofitable. The profitability of particular services is certainly influenced by hospital production decisions, but also by distortions embedded in existing payment systems, such as the Medicare inpatient prospective payment system (Ginsburg and Grossman 2005; Horwitz 2005). Existing literature has identified certain services that are not profitable. These services include burn care, inpatient psychiatric care, psychiatric emergency services, maternity care, AIDS services, substance abuse services, and trauma care (Bazzoli et al. 2005; Gaskin 1999;

Horwitz 2005; Zuckerman et al. 2001). In addition to the services noted above, the services provided to the uninsured are not profitable. Based on national data, uninsured patients disproportionately have low income and are from minority racial or ethnic groups, such as Hispanic or African American (Department of Health and Human Services 2005). These patients usually are not able to pay or only pay a small proportion of hospital cost for their services. Provision of the unprofitable services identified above and the services for the uninsured increase operating costs and financial burden for a hospital, which may threaten their ability to compete with other hospitals in the market, and even future survival.

Although hospitals are not fully reimbursed for the costs of unprofitable services, several still offer them. Horwitz (2005) found that public hospitals offered the largest number of these services, not-for-profit (NFP) hospitals offered several of them, and for-profit (FP) hospitals offered the least. Public hospitals are often viewed as institutions of last resort, with an open door policy for all patients. Thus, it is no surprise that they provide many unprofitable services. NFP hospitals may be motivated to provide these services by several different factors. First, they may believe that provision of these services is consistent with their community service mission, especially if few other facilities offer the services in their communities. Second, NFP hospitals frequently receive tax exemptions from state and federal government and are increasingly being pushed to demonstrate that they are providing community benefit, including care of uninsured patients and provision of subsidized health services (Schlesinger and Gray 2006). FP hospitals do not face these pressures, but likely confront community expectations about the role hospitals should play in the community, including provision of certain services and treatment of the uninsured (Banks et al. 1997).

Traditionally, hospitals have used profits obtained from certain services and payer groups to subsidize the provision of unprofitable services and care of the uninsured. Over the last decade, however, financial constraints from public and private payers increased. Medicare payment constraints implemented in the late 1990s limited the growth of Medicare payments. In particular, MedPAC (2008) reported that total Medicare margins declined from 11.8% in 1997 to -4.8% in 2006. Additionally, MedPAC reported that the proportion of hospitals with negative total margins was 25% in 2006. As a result, the ability of hospitals to cross-subsidize the costs of unprofitable services and patient groups has declined over time.

Previous studies have shown that financial pressure leads to lower uncompensated care provision in NFP hospitals (Bazzoli et al. 2006; Cunningham et al. 2008). However, recent studies have found that safety net hospitals, which are primarily NFP and public hospitals, did not drop unprofitable services during a period when Medicare and Medicaid payments were substantially constrained (Bazzoli et al. 2005). On the face of it, these two sets of findings seem inconsistent. However, it could be that hospitals are making marginal adjustments to service capacity rather than eliminating services altogether when faced with financial pressures. Existing research has not examined this issue specifically. Instead, most studies examining unprofitable services assess whether hospitals offer a particular service or whether they dropped this service over time. In addition, studies have not considered whether hospitals may be taking actions that limit access to certain services by the uninsured while still maintaining access to these services by insured individuals. Strategically, this could make sense for hospitals because they could build long-term relations and loyalty among insured individuals, and thus, even though insured individuals might require unprofitable services at one point, they may return to use more profitable services in the future. Both service elimination and service reductions for different patient groups can have adverse effects on communities, especially if patient needs go unmet or alternatively become more concentrated in public hospitals.

The purpose of this study is to fill the gaps identified above. We examine Healthcare Cost and Utilization Project State Inpatient Data (HCUP-SID), which provides patient discharge data, allowing us to identify the types of services received by patients and their payer status. By examining these data over time, we can examine changes in the volume of specific hospital services for insured and uninsured patients and how these are affected by changing hospital financial condition. Our study examines the period 1996 to 2003, which includes the implementation of the Balanced Budget Act of 1997. This policy had substantial impact on hospital financial condition, and thus, this represents a good period to examine the effects of changing financial condition on changes in unprofitable hospital service provision.

Conceptual Framework

Economic theory provides the conceptual framework for our study and allows us to assess how changing financial condition might affect the behaviors of hospitals. The economic theory of Weisbrod (1980) envisioned that NFP hospitals filled an important role within the community by providing public goods. This theory suggested that FP firms avoid providing public goods because a market for them cannot be sustained. On the other hand, government agencies provide these goods, but at a lower level than many in the community would like because government officials must cater to a diverse electorate with varying preferences for the amount of public good production to support. In this case, NFPs step in to satisfy the desire of those in the community who want to see additional public good provision. Within the hospital sector, public goods, which provide more than just direct benefit to consumers of the good, are typically referred to as “community benefits.” For example, charity care and participation in public programs for low-income individuals benefit many individuals in a community when illnesses are treated early and are thus less likely to spread.

The economic theory of Newhouse (1970) further suggests that NFP hospitals maximize their utility by expanding the quantity and quality of goods produced until the hospital exhausted a budget constraint where total revenues equaled total costs. To maximize utility, hospitals would use the profits of certain well-compensated services to expand the provision of other services and treatment of certain patients for which profits are not achieved.

As financial pressures increase, the resources of NFP hospitals are constrained and this may reduce their ability to provide unprofitable services. In particular, Hoerger (1991, p. 261) commented that:

... in periods of good times an NFP enjoys a fat ‘cushion’ of potential profit which it eschews in favor of increased output. As [the situation] becomes more unfavorable, the NFP cushions the impact on profits by reducing output and acting more like a profit-maximizing hospital.

This could be achieved by NFP hospitals if they reduce their capacity to provide unprofitable services or make it more difficult for the uninsured to access care.

FP hospitals, on the other hand, are profit-maximizers. Hoerger (1991) suggested that in this case FPs are unlikely to change their output levels or mix in the face of general payment pressures because these are already set at cost minimizing levels. Banks et al. (1997) further argued that FP hospitals treat costs of indigent care as one of their business costs, namely as the expense associated with meeting community expectations. If these expectations are unaffected by hospital financial condition, we do not expect FP hospitals to reduce their provision of unprofitable services or care of unprofitable patients as financial conditions worsen.

Overall, our study has two hypotheses drawn from the above discussion:

- H1** NFP hospitals with poor financial condition will provide fewer unprofitable services than those with stronger financial position, *ceteris paribus*.
- H2** There will be no difference in unprofitable service provision across FP hospitals with stronger and weaker financial condition, *ceteris paribus*.

In addition to ownership, institutional, market, and health policy factors will likely influence the amount of unprofitable services hospitals deliver. Hospital characteristics, including hospital bed size, teaching status, and system affiliation, can influence decisions about what services to offer and how much capacity to provide for various service lines. Market factors, such as the percent of the population who are in poverty and the availability of public hospital and teaching hospital beds in the community, can influence the demand or supply of unprofitable services. Finally, health policy, especially Medicaid program characteristics, may affect local need for services and the financial resources available to hospitals to support them.

Methods and Measures

To examine our study questions and hypotheses, several data sources were merged for the period 1996 to 2003. HCUP-SID provided patient discharge data to examine service provision and patient payer source. Hospital cost reports filed with the Centers for Medicare and Medicaid (CMS) were used to measure hospital financial condition. The American Hospital Association annual survey was used to measure hospital structural characteristics. InterStudy provided data on HMO penetration, and the Area Resource File was used to construct community demographic measures. We also obtained data on the number of individuals living in poverty from the US Census Bureau. Finally, measures reflecting state health policies were constructed from the Medicaid Statistical Information System.

The unit of analysis for the study was the hospital. The study sample was drawn from nine states – specifically Arizona, California, Colorado, Florida, Iowa, New Jersey, New York, Washington, and Wisconsin – all of which participated in the Agency for Healthcare Research and Quality's HCUP-SID for the entire eight-year study period. We selected these nine states because each required all general medical/surgical hospitals to supply patient discharge data, and thus, we avoided potential selection issues that might arise due to voluntary reporting. We excluded hospitals in these states with less than 30 staffed beds because small hospitals do not typically provide the unprofitable specialty services that we examined, such as psychiatric or burn care. Further, we limited the sample to hospitals that did not experience ownership changes. This allowed us to examine how hospitals with different ownership types responded to changing financial condition with respect to adjusting their unprofitable services, without the potential confounding effects of hospital ownership changes. Looking across the study years, we had a total of 5,032 hospital-year observations for NFPs, 1,360 for public hospitals, and 1,160 for FP hospitals.

Dependent Variables

The main dependent variable for the study was the volume of unprofitable services, measured separately for insured and uninsured patients. Following Horwitz (2005), we defined unprofitable services to be: maternity care and newborns with complications,¹ psychiatric and substance abuse cases admitted through the emergency department; trauma care; and burn services.² We used diagnosis-related group (DRG) codes as reported in the discharge data to identify patients receiving these services. Patients who were transferred out

¹Maternity cases that did not involve complications became an attractive business for hospitals, especially given enhancements in Medicaid payment and eligibility (Gaskin et al. 2001). Thus, we excluded these cases from our analysis.

to other acute care hospitals were excluded. We aggregated patient-level data to the hospital-level to measure the total volume of unprofitable services for the two payer groups noted above.

In addition, we examined the total volume of trauma care to demonstrate how hospital financial condition may affect an individual service area. Trauma services are interesting to study because patient treatment ranges from those with low to moderately severe injury (e.g., fractured limbs, mild concussion) to highly severe cases (e.g., multiple trauma resulting from automobile accidents or gunshot victims). Institutions that treat the most severe cases must have certain resources immediately available, such as particular surgeons on-site and ready access to operating rooms. These institutional capabilities are well known by local ambulance service agencies (MacKenzie et al. 2006; Branas et al. 2005; Nathens et al. 2004). Thus, there are opportunities to reduce the amount of trauma care provided by eliminating certain needed resources and focusing only on less severe injury cases. For both trauma volume and total unprofitable services volume, we measured values in logs given their non-normal distribution across hospitals in the sample.

Measures of Hospital Financial Condition

The primary explanatory variable in our study was hospital financial condition. We assessed two different financial performance measures that captured different aspects of hospital financial health. First, we examined hospital operating margin, which focused on hospital profitability from patient care business. Operating margin equals the difference between net patient revenue and operating expense, divided by net patient revenue. Hospitals can also receive net revenues through other activities not directly related to patient care, such as investment income, tax appropriations, donations, physician practice management services, and activities such as gift shops, food services, and parking. Our second measure for financial performance accounts for these additional revenues and expenses. Specifically, we constructed the ratio of cash flow to total revenue, which equals net revenues from all sources plus annual depreciation expense,³ divided by total hospital revenues. Hospital cost report data from CMS were used to construct these measures.⁴

We classified hospitals into three groups based on the distribution of data for the two financial performance measures. These three groups were: the 75 percentile or above; the median to the 75th percentile; and below the median, which was used as a reference group.⁵ By grouping hospitals this way, we were able to examine how hospitals with strong and moderately strong financial performance varied in their unprofitable service provision relative to hospitals with financial performance below the median.

Control Variables

As noted in our conceptual discussion, other variables related to the hospital, market, and health policy are likely to influence the amount of unprofitable services provided, and thus, must be controlled in the analysis. Hospital characteristics included hospital bed size, system

²Horwitz (2005) and others have also identified AIDS services as unprofitable. However, these services were increasingly provided on an outpatient basis during the study period. Our data focuses strictly on inpatient care; thus, we excluded AIDS hospitalizations from our study.

³About 50% of hospitals were missing annual depreciation expense data in 2003. We decided to use 2002 reported depreciation expense when 2003 data were missing. This strategy made sense given examination of annual depreciation expense for the adjacent years between 1996 and 2002. Specifically, we found that the year-to-year correlations in this variable was .95 or higher.

⁴Reporting errors in the CMS financial data are well recognized (Kane and Magnus 2001). To deal with potential measurement error that may bias our results, we examined year-to-year changes in the financial data to see if unusually large changes (e.g., big increases or declines) occurred. Based on our analysis, we decided to set annual values of measures to missing if extreme fluctuations occurred (defined as the mean annual change plus or minus 3 standard deviations). Overall, this affected 11.6% of our observations.

⁵These percentiles were based on the pooled financial data from 1996 to 2003.

affiliation, and teaching status. Bed size was measured by the log of staffed beds due to the non-normal distribution of this variable. System was coded as one if a hospital was affiliated with a multi-hospital system, and teaching status was coded as one if a hospital was a member of the Association of American Medical College's Council on Teaching Hospital.

Relevant market factors were measured mostly at the county level and were intended to capture both supply and demand factors relevant for unprofitable services in the market. The percentages of hospital beds in the county that were publicly owned or that were in teaching hospitals were measured. Public hospitals have obligations locally to provide a broad range of care for all types of patients. Teaching hospitals may need to provide a full range of services to train new physicians. Thus, hospitals located in a community with relatively more public hospital or teaching hospital beds may have less need to provide unprofitable services. The percentage of county residents who were in poverty also may affect the amount of unprofitable services demanded in the community. The variables HMO penetration, hospital competition, and the interaction of the two were also included. Previous studies have found that hospitals in markets with high HMO penetration and high hospital competition faced greater price competition (Dranove et al. 1993), suggesting that they are likely to have fewer resources to provide unprofitable services. HMO penetration is measured by the number of people enrolled in HMOs, as allocated to counties based on the HMO's reported service area, divided by total population in the associated counties.⁶ Because the HMO data we had were only consistently available at the MSA-level for our study period, we assumed that HMO enrollment for rural communities was zero. Hospital competition was measured by the Herfindal-Hirschman Index, using hospital inpatient days at the county level. Within counties, we combined market shares for hospitals that belonged to the same multi-hospital system.

Finally, health policy factors were measured at the state level and focused on Medicaid program characteristics. We included the ratio of Medicaid beneficiaries to the number of individuals in poverty within the state.⁷ This variable provides a proxy for Medicaid program generosity. Also, we measured the percentage of Medicaid beneficiaries enrolled in Medicaid managed care plans. The models also included an interaction term for the state of California and the year 1999 given some specific policy changes that affected pregnant women and their eligibility for Medicaid in that year.⁸

Empirical Model and Methods

We examined public, NFP, and FP hospital provision of unprofitable services separately, estimating models for insured and uninsured patients. Specifically, our empirical model was

$$UPF_{it} = \beta_0 + \beta_1 Fin_{it-1} + \beta_2 H_{it} + \beta_3 M_{it} + \beta_4 P_{it} + \beta_5 Y_t + \gamma_i + \varepsilon_{it} \quad (1)$$

where UPF_{it} represents the log of volume of unprofitable services, with i indexing a hospital and t indexing time. Fin_{it-1} is the one-year lagged value of the financial measures. H_{it} and M_{it} represent vectors of hospital and market factors, respectively. P_{it} are the variables for health policy at the state level. The Y_t control for time trends, and are measured as dummy

⁶The historical data files we had lacked HMO penetration data for Washington and Wisconsin in the years 1996 and 1997. Given this, we used data on HMO penetration in 1998 for 1996 and 1997 in these two states.

⁷Data for the ratio of Medicaid beneficiaries to the poor population in a state were only available beginning in 1999. Thus, we used the 1999 values of these variables for earlier years in the study states.

⁸California implemented the Family Planning, Access, Care, and Treatment program in the fiscal year 1997–1998, which substantially reduced the unintended pregnancy rate and the number of uninsured pregnant women after 1999 (Foster et al. 2004).

variables from 1997 to 2003 with 1996 as a reference group. γ_i is a hospital-specific error component, which is assumed to be time invariant, and ε_{it} represents a random error term.

The standard approach for estimating a longitudinal model is fixed-effects or first differences, which in essence eliminates γ_i from (1). However, it is important to recognize that our model violates the assumption of strict exogeneity, which underlies these estimation methods. Specifically, the financial performance measures in our model are not strictly exogenous, even though lagged, given potential feedback effects that result between unprofitable service provision and financial performance. Specifically, financial performance in a year $t-1$ (Fin_{it-1}) affects the volume of unprofitable services in the subsequent year (UPF_{it}), which in turn affects financial performance in year t (Fin_{it}). Given this, an instrumental variable approach to estimation is needed (Wooldridge 2003). Following Mark et al. (2005), we used the lagged two-year values for the financial variables as an instrument for the one-year lagged financial variables.⁹

Empirical Results

We begin our discussion of results by examining the demographic characteristics of the uninsured in each state. In general, approximately 50% of uninsured patients in our study sample are white across all study states, with the remainder being mainly either black or Hispanic. Some states such as Arizona have a higher percentage of Hispanic than black; however, other states, such as New York have a higher percentage of black than Hispanic.¹⁰ The uninsured were equally split among males and females, and the majority of uninsured patients are between the ages of 18 and 45. Figure 1 reports trends in total volume of uninsured patients per staffed hospital bed for NFP, FP, and public hospitals, respectively. We report these descriptive data on a per bed basis to account for variations in hospital bed size that exist across ownership categories. As expected, public hospitals provide the highest volume of services for the uninsured and NFP and FP hospitals provide similar volume for uninsured patients. Table 1 identifies the fifteen most common DRGs for the uninsured in our study sample in 2003.¹¹ More than half of these DRGs were identified as unprofitable services in the literature, as noted earlier (Bazzoli et al. 2005; Gaskin 1999; Horwitz 2005; Zuckerman et al. 2001). Although trauma and burn care are not included in Table 1, these events are likely to be rare relative to more common afflictions, such as chest pain and appendectomy.

Figures 2 and 3 report trends in total volume of unprofitable services per staffed hospital bed for insured and uninsured patients, respectively, as provided by three different hospital ownerships noted above. Similar to the Fig. 1, public hospitals provide the highest volume of unprofitable services per bed, but NFP hospitals, in general, provide higher volume than FP hospitals. This is true for both uninsured and insured groups for most of the study years. Figures 4 and 5 report similar data for trauma care. The trauma figures generally show similar patterns to those noted above for total unprofitable services.

Table 2 presents descriptive statistics on the dependent and explanatory variables for the three hospital ownership groups. These data represent means or sample proportions of each

⁹We estimated reduced form models to assess the validity of the instruments. These models were estimated separately for public, NFP, and FP hospitals. Different versions of models were estimated using continuous financial measures and categorical versions of these measures. Overall, we estimated 18 different versions of these models across the 3 ownership categories. All but three indicated that the two-year lagged financial variable was highly correlated to the one-year lagged value in the reduced form model ($p < .05$). Thus, we judged the two-year lagged financial variables to be generally good instruments for the one-year lagged values.

¹⁰The states of California, Colorado, and Iowa have more than 20 percentage of missing value on the race variable after 2000 and Washington does not provide race data at all.

¹¹The top fifteen DRG codes in our study states are similar across study years. Therefore, we only present the results in 2003.

variable across all hospitals and all study years from 1996 to 2003. Approximately 52% of FP hospitals, 20% of NFP hospitals, and 19% of public hospitals are in strongest financial category (75th percentile or above) when financial performance is measured by cash flow to total revenue. This means that financial performance of FP hospitals generally was stronger than that of NFP and public hospitals. A similar pattern was found when financial performance was measured by operating margin.

Table 3 presents the results from the multivariate analysis for the total volume of unprofitable services for the insured and uninsured based on cash flow to total revenue. Looking at the results for NFPs, hospitals with the strongest financial performance (at 75th percentile or above) provide higher volumes of unprofitable services for insured patients ($p<0.05$) and those with moderately strong (between the median and 75th percentile) and the strongest (at 75th percentile or above) performance provided higher volume of these services to the uninsured ($P<0.01$). All of these effects are measured relative to NFP hospitals with weaker performance. These findings support the hypothesis that NFP hospitals use their financial resources to expand the provision of unprofitable services. For the public and FP hospitals, the results for cash flow to total revenue are insignificant in both the insured and uninsured models.

Among the hospital and market control variables, none were significant in the models for insured and uninsured patients with one exception: increases in the percentage of public beds in the county lead to higher volume of unprofitable services provided by NFP hospitals for uninsured patients, which is opposite to our expectation. We believed this variable would capture available supply of unprofitable services provided by other hospitals in the county, but instead, it may be capturing unmeasured demand for these services. For the control variables related to health policy, increases in the ratio of Medicaid beneficiaries to the poor population were negatively related to the volume of unprofitable services for uninsured patients across the three ownership groups ($p<0.01$ for NFP and FP hospitals, and $p<0.05$ for public hospitals), which is consistent with our expectation. Additionally, the interaction between the year 1999 and the state of California is significant and negative for insured and uninsured patients in NFP hospitals ($p<0.01$), but is only negatively significant for uninsured patients in FP hospitals ($p<0.01$).

As discussed above, cash flow to total revenue measures the financial performance resulting from all patient care and non-patient care activities, while operating margin measures the financial performance from patient business only. We replicated the same analysis replacing the cash flow to total revenue measure with the operating margin measure. Table 4 summarizes the results for the operating margin variables by ownership type only, because results for the other variables are similar to those reported in Table 3.¹² The results in Table 4 indicate that none of the coefficients for the operating margin measures were significant for any of the ownership categories. These results, in conjunction with those in Table 3, suggest that hospitals use overall financial resources from all business activities, rather than those generated strictly from patient care, to support unprofitable services.

Finally, Table 5 reports the results for trauma care. The only significant ($p<0.01$) result was found for insured patients in the NFP hospital sample with the strongest cash flow to total revenue category. All results for the operating margin models remain insignificant. These findings were unexpected because we believed that NFP hospitals would have the ability to adjust trauma volume more readily than other kinds of hospital services. They appear to do so, but only in order to expand volume for insured patients when they have strong cash flow relative to total revenues.

Discussion and Conclusion

This study provides important insights on hospital decision-making in relation to service capacity, focusing on services for which reimbursements fall short of associated costs. Earlier safety net institutions (mainly public or NFP hospitals) studies found that these hospitals did not eliminate certain services altogether when payment pressures were present (Bazzoli et al. 2005; Zuckerman et al. 2001). However, we found that NFP hospitals are likely to marginally adjust their volume of unprofitable services depending on their financial circumstances. Those NFPs with stronger financial performance provide more of these services than those with weaker condition, *ceteris paribus*, especially for uninsured patients. Conversely, this implies that as financial resources become strained, hospitals may limit service capacity and access to care for these services.

Additionally, our findings when taken with other studies provide strong support for the Newhouse (1970) economic model of NFP hospital behavior. His model suggested that NFPs seek to maximize a utility function based on quality and quantity, increasing both to the point where total revenues equal total cost. This implies that NFPs with more financial resources will provide higher quality and greater quantities of subsidized health services, *ceteris paribus*. Prior studies have found that NFPs with better financial performance provide higher quality of care (Encinosa and Bernard 2005; Bazzoli et al. 2008). Our study complements this earlier work by showing that stronger NFP financial performance may lead to more unprofitable service provision as well.

The results for the two different financial performance measures also provide important insights. We found that NFP provision of unprofitable services was significantly related to the ratio of cash flow to total revenues but not to operating margin. This finding suggests that NFP hospitals do not simply use net income derived from patient care to cross-subsidize health services that have poor reimbursement or that are commonly used by the uninsured. Instead, they focus on the complete financial picture for an institution. Low operating margins can be offset by other sources of hospital financial support and these seem to be important for providing unprofitable services, especially for the uninsured.

The demographics of the uninsured in our study sample are consistent with national data, indicating that the majority of the uninsured are white and that there is a disproportionate share of the uninsured population that are Hispanic or Black (Department of Health and Human Services 2005). However, our study has several important limitations to note. First, we focus on only nine states and thus, the findings may not generalize to hospitals overall in the US. Second, our models did not yield many significant findings, which was a surprise given that many of the control variables examined were used in earlier studies of uncompensated care (*c.f.*, Davidoff et al. 2000). We believed that they would thus be relevant in our models, especially for unprofitable service provision for the uninsured. More focused study and model development for the specific services studied may be needed through future research. Third, we recognize that our approaches for dealing with the violation of strict exogeneity in the empirical models, namely the use of first difference models with instrumental variables, have limitations. Ideally, one would want to study the effects of exogenous shocks that affect hospital decision-making and behavior. Although payment policy changes in 1997 through the Balanced Budget Act may have initially represented such an exogenous shock, examination of hospital response to their changing financial condition through subsequent years, such as through 2003 in this study, lacks such an exogenous change to isolate resulting effects.

Although this study has limitations, our findings have important implications for health care policy. First, there has been substantial debate about NFPs and the community benefit they

provide. In large measure, this debate has focused on whether NFP tax exemptions are justified, namely are NFPs creating sufficient community benefit to warrant these exemptions. Our findings provide evidence that NFPs with strong financial performance are using their profits to provide more unprofitable services, especially for the uninsured. Thus, these more profitable NFPs that would have had to pay more taxes than NFPs with weaker financial status (if NFPs were taxed) do appear to be providing greater amounts of community benefit in terms of care for the uninsured and provision of subsidized services. Of course, more research is needed to determine whether resulting levels of care are sufficient to justify tax exemptions, and whether the financial burden of unprofitable services should be compensated through favorable tax status or through cross-subsidization in some other way.

A second policy implication of the study relates to hospital payment policy. As noted in the introduction of the paper, it is widely recognized that some hospital services are paid at rates that exceed associated costs and others have payments less than costs. Researchers have commented on how these payment policies can create disincentives and distortions in health care delivery (Ginsburg and Grossman 2005). Our study documents one such distortion, namely that NFP hospitals may change the level of unprofitable services offered depending on their overall financial condition. This could leave patients, whether insured or uninsured, without ready access to needed services. It is worthwhile to conduct additional research to identify the types of delivery distortions that occur given the incentives present in payment policy. Such evidence might help convince policy makers to increase the pace at which they reevaluate and address existing distortions in payment policies.

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Fig. 1.
Trend in total volume for uninsured patients per staffed hospital bed

Fig. 2.
Trend in total volume of unprofitable services per staffed hospital bed for uninsured patients

Fig. 3.
Trend in total volume of unprofitable services per staffed hospital bed for insured patients

Fig. 4.

Trend in total volume of trauma services per staffed hospital bed for uninsured patients

Fig. 5.
Trend in total volume of trauma services per staffed hospital bed for insured patients

Table 1

Top fifteen DRGs in study states in 2003

DRG Code	DRG Title
89	Simple pneumonia and pleurisy age > 17 with CC ^a
127	Heart failure and Shock
143	Chest pain
167	Appendectomy without complicated principle diagnosis without CC
182	Esophagitis, gastroent & MISC digest disorders age > 17 with CC
183	Esophagitis, gastroent & MISC digest disorders age > 17 without CC
371	Cesarean section without CC
373	Virginal delivery without complicating diagnoses
390	Neonate with other significant problems
391	Normal newborn
426	Depressive neuroses
430	Psychoses
449	Poisoning and toxic effects of drugs age > 17 with CC
521	Alcohol/drug abuse or dependence with CC
523	Alcohol/drug abuse or dependence without rehabilitation therapy without CC

^a CC comorbidity and complication

Table 2

Means and standard deviations of study variables

	FP ^a	NFP ^b	Public
Hospital Financial Performance Category			
Cash flow to total revenues			
Below the median (omitted category)	32.87% (47.00)	52.67% (49.93)	54.57% (49.81)
Median to 75th percentile	15.59% (36.30)	26.92% (44.36)	26.06% (43.92)
75th percentile or above	51.54% (50.00)	20.41% (40.31)	19.38% (39.54)
Operating margin			
Below the median (omitted category)	21.81% (41.32)	51.26% (49.99)	68.84% (46.34)
Median to 75th percentile	11.91% (32.40)	29.38% (45.56)	19.37% (39.53)
75th percentile or above	66.28% (47.30)	19.36% (39.51)	11.80% (32.27)
Hospital Characteristics			
Number of staffed beds	179.48 (107.94)	236.89 (183.05)	192.13 (212.85)
Teaching hospital	9.97% (11.50)	7.97% (27.08)	12.69% (33.30)
Multi-hospital system member	82.60% (37.93)	54.12% (49.83)	34.41% (47.53)
Health Policy Measures			
Ratio of Medicaid beneficiaries to the number of individuals living in poverty	1.04 (0.32)	1.05 (0.27)	1.09 (0.29)
Medicaid managed care penetration	0.55 (0.10)	0.61 (0.16)	0.55 (0.12)
Market Characteristics			
Private HMO market share	0.34 (0.18)	0.28 (0.20)	0.19 (0.21)
HHI ^c -inpatient days	0.30 (0.26)	0.44 (0.30)	0.52 (0.35)
Proportion of population living in poverty	0.13 (0.02)	0.12 (0.03)	0.12 (0.03)
Proportion of hospital beds in county that are publicly owned	0.12 (0.15)	0.09 (0.13)	0.58 (0.39)
Proportion of hospital beds in county that are in teaching hospitals	0.10 (0.11)	0.13 (0.21)	0.09 (0.19)
Number of observations	1,160	5,032	1,360

^aFP for-profit hospitals,^bNFP not-for-profit hospitals,^cHirschman-Herfindahl Index

Table 3
Results from first differenced instrumental variables analysis of unprofitable services: cash flow to total revenue

Explanatory Variables	NFP		Public		FP	
	Insured	Uninsured	Insured	Uninsured	Insured	Uninsured
Lagged cash flow to total revenue						
75th percentile or above	0.840* (0.339)	1.629** (0.537)	-0.167 (0.603)	-0.098 (1.200)	-0.848 (1.240)	-1.282 (1.505)
Median to 75th percentile	0.360 (0.210)	1.219** (0.333)	-0.261 (0.379)	-0.570 (0.754)	-1.027 (0.937)	-1.747 (1.137)
Hospital Characteristics						
Number of staffed beds (log)	-0.454 (0.371)	0.287 (0.587)	0.737 (0.792)	0.770 (1.576)	-0.615 (1.072)	2.509 (1.301)
Teaching hospital	-0.077 (0.960)	0.006 (1.521)	-0.256 (0.996)	0.755 (1.981)	0.399 (4.349)	-0.840 (5.279)
Multi-hospital system member	-0.339 (0.220)	-0.628 (0.349)	-0.050 (0.469)	-0.239 (0.934)	-1.403 (1.512)	-1.676 (1.835)
Market Characteristics						
Private HMO market share	1.357 (0.987)	-2.067 (1.564)	-1.771 (2.000)	0.026 (3.979)	-0.172 (3.395)	-6.324 (4.121)
HHI-inpatient days	1.404 (0.952)	0.324 (1.509)	-0.168 (1.825)	-6.657 (3.632)	2.050 (6.279)	5.248 (7.622)
HMO penetration * HHI	-1.592 (2.084)	5.975 (3.302)	3.974 (6.291)	5.385 (12.518)	-4.508 (9.069)	4.212 (11.009)
Proportion of population living in poverty	-1.388 (14.513)	7.350 (22.992)	15.760 (30.746)	-40.391 (61.181)	-58.111 (80.760)	10.276 (98.033)
Market Characteristics						
Proportion of hospital beds in county that are publicly owned	1.719 (0.888)	3.140* (1.406)	-2.102 (2.240)	1.566 (4.457)	3.279 (4.126)	0.796 (5.008)
Proportion of hospital beds in county that are in teaching hospitals	0.130 (0.804)	0.026 (1.275)	0.147 (3.954)	-4.301 (7.868)	-6.594 (5.429)	-7.681 (6.591)
Health Policy						
Ratio of Medicaid beneficiaries to the number of individuals living in poverty	-0.292 (0.679)	-3.006** (1.076)	-0.347 (1.534)	-6.047* (3.052)	-1.056 (3.305)	-10.352** (4.012)
Medicaid managed care penetration	-0.036 (0.644)	-0.609 (1.020)	-0.509 (1.486)	-0.698 (2.957)	-8.435 (6.310)	-7.287 (7.659)
California * 1999	-1.049** (0.237)	-2.233** (0.375)	0.366 (0.476)	-1.822 (0.946)	-1.585 (0.889)	-4.232** (1.079)
Year Variables						
1998	0.129 (0.129)	-0.128 (0.204)	0.103 (0.287)	-0.321 (0.571)	-0.702 (0.864)	-0.447 (1.048)
1999	0.164 (0.273)	-0.012 (0.433)	-0.005 (0.555)	-1.888 (1.105)	-1.286 (1.812)	-0.213 (2.199)
2000	0.170 (0.331)	0.299 (0.524)	0.264 (0.660)	-1.263 (1.314)	-1.735 (2.316)	0.733 (2.811)
2001	0.362 (0.320)	0.431 (0.507)	0.302 (0.648)	-0.724 (1.290)	-1.364 (1.962)	0.524 (2.382)
2002	0.248 (0.325)	0.578 (0.514)	0.081 (0.643)	-0.568 (1.280)	-2.326 (1.837)	0.019 (2.230)
2003	0.432 (0.351)	1.020 (0.556)	0.352 (0.703)	0.175 (1.399)	-1.082 (1.788)	1.833 (2.171)

Explanatory Variables	NFP		Public		FP	
	Insured	Uninsured	Insured	Uninsured	Insured	Uninsured
Number of hospitals	3,070		855		712	

* $P<0.05$,

** $P<0.01$

Table 4

Results from first differenced instrumental variables analysis of unprofitable services: operating margin

	NFP		Public		EP	
	Insured	Uninsured	Insured	Uninsured	Insured	Uninsured
Lagged operating margin						
75th percentile or above	-0.078 (0.400)	1.020 (0.689)	-1.787 (1.659)	3.763 (3.669)	0.915 (1.545)	1.470 (1.970)
Median to 75th percentile	-0.041 (0.215)	0.456 (0.370)	-0.141 (0.599)	0.685 (1.324)	1.561 (1.187)	0.579 (1.514)

* $P < 0.05$,** $P < 0.01$

Table 5

Results from first differenced instrumental variables analysis of trauma services: cash flow to total revenue and operating margin

	NFP		Public		FP	
	Insured	Uninsured	Insured	Uninsured	Insured	Uninsured
Lagged cash flow to total revenue						
75th percentile or above	0.947** (0.330)	1.137 (0.864)	-0.675 (0.646)	1.707 (1.409)	-0.202 (1.113)	2.721 (1.752)
Median to 75th percentile	0.253 (0.205)	0.931 (0.535)	-0.238 (0.406)	1.531 (0.885)	-0.511 (0.841)	2.043 (1.324)
Lagged operating margin						
75th percentile or above	0.387 (0.406)	0.159 (1.164)	-1.289 (1.717)	-1.077 (4.282)	0.828 (1.404)	4.319 (2.337)
Median to 75th percentile	0.079 (0.218)	-0.325 (0.626)	-0.212 (0.620)	1.496 (1.545)	1.298 (1.079)	0.088 (1.796)

* $P < 0.05$,** $P < 0.01$