WORKING PAPERS

Hospital Competition and Charity Care

Christopher Garmon

WORKING PAPER NO. 285

October 2006

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BUREAU OF ECONOMICS
FEDERAL TRADE COMMISSION
WASHINGTON, DC 20580

Hospital Competition and Charity Care

Christopher Garmon[1]
Bureau of Economics
Federal Trade Commission
Washington, DC

Draft: October 2006

Abstract: This paper explores the relationship between competition and hospital charity care by analyzing changes in charity care associated with changes in a hospital's competitive environment (due to mergers and divestitures), using hospital financial and discharge data from Florida and Texas. Despite the pervasive belief that competition impedes a hospital's ability to offer services to the uninsured and under-insured, I find no statistically significant evidence that increased competition leads to reductions in charity care. In fact, I find some evidence that reduced competition leads to higher prices for uninsured patients.

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[1] The views expressed in this paper are the author's, not necessarily those of the Federal Trade Commission or any individual Commissioner. I would like to thank Marissa Crawford and Michelle Kambara for their valuable research assistance on this project. I would also like to thank Gloria Bazzoli, Denis Breen, Cory Capps, Martin Gaynor, Daniel Hosken, participants at the American Society of Health Economists Conference, and anonymous referees for their helpful comments and suggestions. Any remaining errors are my responsibility.

1. Introduction

In 2003, over 25 percent of the U.S. population under age 65 lacked health insurance at some point during the year. Almost 14 percent of the U.S. population under age 65 was uninsured for the entire year.[2] For many of the uninsured, but particularly those with low incomes and high annual health care usage, charity care by health care providers represents a large fraction of the healthcare they receive. For the uninsured overall between 1996 and 2000, 64 percent of their healthcare was charity care. For uninsured families of four with incomes less than $51,000[3] and average annual healthcare usage greater than $10,000, 87 percent of their health care was charity care.[4]

Given the relatively large number of Americans who lack health insurance and their dependence on charity care, it is surprising how little research exists about the effect of competition on the provision of charity care. This may be due to the widespread belief that increased competition inhibits a provider's ability to offer charity care because managed care payers pay less with more provider competition. In other words, many believe that insured patients, particularly managed care and privately insured patients, cross-subsidize a hospital's charity care. If a hospital must charge less to private payers due to increased competition, it will have fewer resources to treat the uninsured. As one author recently stated: "The more the financing of hospital care moves in the direction of a 'perfect' market, the less and less funding for community service there will be."[5] Throughout the health policy literature, this view of the inverse relationship between competition and charity care is seen as almost tautological.

However, having market power does not imply that it will be used for philanthropy. Certainly, there is no expectation of this with a for-profit firm, but many hospitals are non-profit entities. The expectation is that non-profit hospitals have their community's welfare as an

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[2] Rhoades (2005)

[3] This is 300% of the poverty threshold in 2000.

[4] Herring (2005)

[5] Vladeck (2006), page 42

objective, so they will provide free or below cost services to those in need. (In fact, previous theoretical models of charity care model it as a direct argument of the hospital's utility function.) Recently, the behavior of non-profit hospitals in providing charity care has been called into question. Several high-profile lawsuits have been filed against non-profit hospital systems accusing them of providing too little charity care and over-charging the uninsured.[6] Congress recently convened hearings to investigate whether non-profit entities (including hospitals) provide community benefits commensurate with their status. A GAO report prepared for those hearings found that the difference between the average charity care provided by non-profit hospitals and that provided by for-profit hospitals was surprisingly small and, in one of the five states studied, was even negative. [7]

It is possible that hospitals (non-profit and for-profit) treat their uninsured patients much as recent research suggests they treat their managed care customers when obtaining market power: by increasing the effective price or, in the case of the uninsured, reducing charity care. In any event, the effect of competition on hospital charity care is an empirical question, one that has received little attention, particularly in the past ten years.

The only published articles, of which I am aware, that investigate the relationship between competition and charity care are Frank and Salkever (1991), Gruber (1994), Mann et al. (1995), and Mann et al. (1997). Frank and Salkever's results imply that overall charity care will increase as the number of hospitals increase (holding overall beds constant), but their model is

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[6] See Weissman (2005); By law, hospitals with emergency rooms must at least stabilize patients before transfer regardless of ability to pay and some states and local jurisdictions have additional access regulations, so some charity care is mandated by law. However, for private hospitals, much charity care is at the hospital's discretion. First and foremost, uninsured patients are, at least initially, faced with the hospital's "billed charges" (i.e., list price) for their services, not the discounted prices most insured payers face. Except in Maryland, these charges are set by each hospital or system. In addition, hospitals set their charity care policy (e.g., based on patient income) and its accessibility, if they have an explicit charity care policy. Hospitals also exercise discretion in how aggressively they attempt to collect bad debt and/or how readily they convert it to "charity care" retroactively.

[7] GAO (2005)

estimated using data from Maryland, where hospital prices are regulated. Using California data, Gruber (1994) and Mann et al. (1995) both find that charity care decreases faster in relatively competitive markets than in relatively uncompetitive markets in response to an exogenous reimbursement change affecting all hospitals (e.g., switch from a charge based system to a prospective payment system for Medicare). Although closely related, these latter two findings don't directly address the relationship between competition and charity care. Gruber, in particular, investigated the effect of the regime shift in California in 1983 that allowed selective contracting by health insurers on the provision of charity care and how this varied across competitive conditions. He found that charity care fell more in relatively competitive markets in response to this regime change, but did not report whether it remained higher than or fell below the charity care provided in less competitive markets. Likewise, Mann et al. (1995) investigated the effect of Medicare and Medi-Cal reimbursement changes on charity care and its relationship to competition. They also found that charity care fell more in competitive markets, but one table[8] suggests that it remained higher than in less competitive markets. Mann et al. (1997) again report that hospitals provide more uncompensated care in competitive markets, but also find that "the greater the degree of HMO penetration, the lower the provision of uncompensated care relative to the hospital's size, with the effect being stronger in the most competitive markets."[9] None of these papers investigate the effect of competition changes (i.e., mergers and divestitures) on charity care. Apart from Mann et al. (1997), the previous studies used data exclusively from the early and mid 80's, before the rise of managed care and subsequent backlash of recent years.

In this paper, I investigate the relationship between changes in competition and changes in charity care using hospital financial and discharge data from Florida and Texas from 1999 and 2002. Florida and Texas are two of the few states that report detailed hospital financial information including charity care, bad debt and the net revenue received from uninsured patients. The hospital markets in Florida and Texas are not price-regulated, allowing the possibility that a hospital could use additional market power rents from managed care customers

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[8] Exhibit 2 on page 267 of Mann et al. (1995).

[9] Mann et al. (1997), page 230.

to increase charity care. In addition, both Florida and Texas have many for-profit and non-profit hospitals, providing a means to test whether mergers and divestitures have different effects on charity care depending on the type of ownership. However, hospitals in the two states face different regulatory environments. Florida is a "certificate of need" state, in which hospital entry and expansion are regulated, while Texas is not. Using the data from both states may provide some insight on a hospital's response to changing competitive conditions under different regulatory systems.

Apart from data availability, the time period 1999-2002 is chosen for two reasons. First, in both states, many mergers and divestitures occurred in 2000 and 2001 between hospitals near one another, producing the variation in concentration necessary to study the effects of competition on charity care. Second, this time period is distinguished by its relative lack of hospital antitrust activity. Between 1995 and 1999, the Federal Trade Commission, the Department of Justice, and the California Attorney General's Office were unsuccessful in six straight hospital merger challenges. Between 1999 and 2002, the federal antitrust agencies did not challenge any hospital mergers. Thus, the period between 1999 and 2002 is likely one in which hospitals felt relatively unconstrained by antitrust regulation. Inferences drawn about the effects of hospital competition using data from this period are likely to be more accurate.

As one might suspect, the main empirical challenges to studying competition's effect on charity care are measuring the level of competition faced by a hospital and the charity care provided by the hospital. Following the previous literature, I measure charity care using the hospital's inpatient charity care and bad debt charges multiplied by the hospital's cost-to-charge ratio. To more directly measure competition's impact on uninsured patients, I also analyze the hospital's net inpatient revenue per admission for uninsured patients. I also analyze outpatient charity care and bad debt costs since there is some evidence that outpatient services to the uninsured have been declining more rapidly in recent years than inpatient services, particularly among private hospitals.[10] Competition is measured with the system-specific Herfindahl-Hirschman Index (SSHHI), which has been used by many researchers (such as Gruber (1994) and

[10] Bazzoli et al. (2005)

Capps and Dranove (2004)) to study hospital competition.

Overall, I find some evidence that competition and charity care, if anything, are positively related. With the exception of Texas for-profit hospitals, I find little evidence that increasing concentration either increases or reduces charity care as measured by uncompensated inpatient care costs. For Texas for-profit hospitals, I find evidence that increasing concentration is associated with reduced charity care. I find some evidence, particularly strong in Texas, that hospitals facing reduced competition increase their prices to uninsured patients. Although further work is needed to investigate the determinants of hospital charity care, these results provide no support to the claim made by some that hospital mergers lead to benefits for uninsured patients through cross-subsidization from insured patients.

The paper is organized as follows. Section 2 describes the econometric model and its theoretical basis. Section 3 describes the data and construction of the variables. Section 4 describes and discusses the results. Section 5 concludes and discusses areas for further work.

2. Model

Frank and Salkever (1991) and Gruber (1994) both model charity care as a direct argument of a hospital's utility function. This seems unnecessarily ad hoc in motivating an analysis of charity care and counterintuitive as well. It would seem to suggest, for instance, that a hospital would benefit if more of its patients were poor and uninsured, needing charity care. Instead, I follow Gaynor and Vogt (2003) and model hospital utility as a function of profit and, separately, quantity. The latter argument reflects the possibility that a hospital's objective may not coincide perfectly with profit-maximization, but may also reflect a desire to serve the community by providing more hospital services than would maximize profit. In this context, charity care can be seen as a means to practice price discrimination: the discount given to uninsured patients (possibly contingent on some imperfect observation of the patient's wealth).[11] However, unlike price discrimination in other industries, charity care (as well as the discounts given to insured patients) may be used to satisfy objectives other than pure profit-maximization.

[11] Charity care is also sometimes provided to insured patients with high co-pays and deductibles, but most charity care is provided to uninsured patients.

Consider a market with N hospitals, each providing hospital services (which can be represented with a quantity metric Q) to two types of customers: insured patients (super-scripted with an i) and uninsured patients (super-scripted with a u). Each hospital h chooses the price to charge its insured patients, p_h^i, and the price to charge its uninsured patients, p_h^u, to maximize utility subject to a break-even constraint:

(1)
$$\begin{aligned} &Max_{p_h^i p_h^u} U_h(\Pi_h, Q_h) \\ &s.t. \Pi_h \geq 0 \end{aligned}$$

where

(2)
$$Q_h = Q_h^i(p^i) + Q_h^u(p^u)$$

and

(3)
$$\begin{aligned} p^i &= (p_1^i, p_2^i, \ldots, p_h^i, \ldots, p_N^i) \\ p^u &= (p_1^u, p_2^u, \ldots, p_h^u, \ldots, p_N^u) \end{aligned}$$

reflecting the competition faced by hospital h from the N-1 other hospitals in providing services to the two types of patients. Hospital h's profit is:[12]

(4)
$$\Pi_h = p_h^i Q_h^i(p^i) + p_h^u Q_h^u(p^u) - C(Q_h)$$

Assuming the profit constraint in (1) does not bind, the hospital's first order necessary condition with respect to the uninsured price is:

(5)
$$U_\Pi \left[Q_h^u + p_h^u \frac{\partial Q_h^u}{\partial p_h^u} - C' \frac{\partial Q_h^u}{\partial p_h^u} \right] + U_Q \frac{\partial Q_h^u}{\partial p_h^u} = 0$$

where

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[12] Hospitals have no say in the price they must charge to their Medicare and Medicaid patients. Without loss of generality, it is assumed that the hospital's profit from serving Medicare and Medicaid patients is zero.

(6) $$U_X = \frac{\partial U}{\partial X}$$

for X = Π, Q. Rearranging this to solve for the uninsured price/cost margin:

(7) $$\frac{p_h^u - C'}{p_h^u} = -\frac{1}{\varepsilon^u} - \frac{U_Q}{U_\Pi p_h^u}$$

where ε^u is the price elasticity of hospital h's residual demand from uninsured patients. Equation (7) is, of course, just a modified version of the Lerner Index of market power. In particular, it implies that as competition increases, which increases (in absolute value) the hospital's elasticity of residual demand from uninsured patients, the price charged to uninsured patients will fall. As (7) illustrates, this effect will be smaller for hospitals with objectives apart from profit-maximization. Of course, there is also a condition analogous to (7) for insured patients.

However, the derivation of (7) assumes that the hospital's profit constraint does not bind. If the profit constraint binds, it is possible that the average price charged to patients is higher than the hospital would set without the constraint (i.e., the hospital would like to lower its price to both types of patients to provide more services to the community (i.e., more Q), but cannot without generating a loss). If competition is reduced, particularly for insured patients, lowering (in absolute value) the hospital's elasticity of residual demand from insured patients, the hospital may be able to increase the price charged to insured patients while reducing the price charged to uninsured patients, leading to an overall increase in Q.[13]

Therefore, it is not clear whether reduced competition will lead to more or less charity care. Since the effect described in the previous paragraph requires the profit constraint to be binding and requires objectives other than profit-maximization, one would expect to most often observe a reduction in competition lead to increased charity care for non-profit hospitals in competitive markets. Consistent with (7), charity care reductions in response to lessening

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[13] This, of course, requires that $\epsilon^u < \epsilon^i$ (i.e., > in absolute value) which is likely since insured patients only see a small portion of any hospital price increase in their co-insurance, if they see any of it at all.

competition should be more often observed from for-profit hospitals in less competitive markets (where the profit constraint does not bind).

Given the previous discussion, the price charged to uninsured patients by a hospital is modeled as a function of the competition the hospital faces and other characteristics of the hospital:

(8) $$p_{ht}^{u} = \alpha + \beta COMP_{st} + \varphi \cdot X_{ht} + \gamma \cdot Y_{h} + \tau_{h} + \mu_{ht}$$

for hospital h belonging to system s at time t. COMP is the level of competition faced by the system to which h belongs. The SSHHI (described in more detail below) will be used as a proxy for this. X is a vector of hospital characteristics related to the cost of providing care to the uninsured or the demand for hospital services by the uninsured that is time dependent (e.g., the mix of uninsured patient diagnoses). Y is a vector of hospital characteristics that is not time dependent (e.g., number of licensed beds) for the duration of the data sample. $\tau+\mu$ is the error term with τ the fixed, hospital-specific component of the error. τ can be thought of as the aggregation of factors that affect the cost or demand of hospital services for the uninsured, but are unobservable or difficult to measure (e.g., ease of access via public transportation).

The presence of hospital-specific, but unmeasurable factors that affect charity care makes the simple cross-sectional estimation of (8) potentially unreliable as some of these factors may be correlated with the hospital's patient flows which are used to measure the level of competition facing the hospital. To avoid this problem, instead of estimating (8), I estimate the differenced version of (8):

(9) $$\Delta p_{h}^{u} = \beta \Delta COMP_{s} + \varphi \cdot \Delta X_{h} + \Delta \mu_{h}$$

Even after differencing, two problems remain which may bias the results. First, as hospitals constantly and imperfectly adjust to new equilibria, hospitals with lower prices may be more likely to increase their prices and hospitals with higher prices may be more likely to lower their prices. In addition, under-performing hospitals are more likely to be acquired, potentially by nearby hospitals. Following Krishnan (2001), I include the residual of the base period's cross sectional regression as another covariate to account for this problem.

Second, since the competition measure, SSHHI, is based on market shares within sub-

groups, which are partially determined by price, there is the potential for bias from the use of an endogenous variable. To avoid this bias, I use the predicted change in the SSHHI based on the base period market shares. (In other words, the 2002 shares are calculated using the 1999 data with the 2002 system configurations.) Since some bias may remain because of the endogeniety of price and market shares in the base period, I also calculate the SSHHI using flows for insured patients, not uninsured patients. This has the added benefit of more directly testing the central hypothesis that increases in market power over insured patients will lead to more charity care through cross-subsidization.

Since theory suggests that the effect of competition on charity care and the price charged to uninsured patients will vary with the objectives of the hospital, equation (9) is estimated separately for for-profit and non-profit hospitals. In addition, since theory suggests that the effect of changes in competition on changes in charity care could vary with the initial competitive conditions, I include the base period (1999) SSHHI as an independent variable. While equation (9) eliminates any hospital characteristic that is constant over time, it is possible that charity care may change at a different rate at teaching hospitals and private hospitals with many public hospitals nearby since teaching hospitals and public hospitals are the primary "safety-net" hospitals in many communities. The number of public hospitals in the hospital's county and a dummy variable for teaching status are included as independent variables to account for this possibility. Thus, the model actually estimated is:

$$(10)\ \Delta p_h^u = \beta_1 COMP_{s1999} + \beta_2 \Delta COMP_s + \varphi \cdot \Delta X_h + \eta_1 TEACH_h + \eta_2 (\#PUBLIC)_h + \Delta \mu_h$$

3. Data and Variable Construction[14]

The primary source of data for this project is hospital financial and inpatient discharge data from the Florida Agency for Health Care Administration, the Texas Department of Health

[14] A detailed description of the data and variables is included in Appendix A.

and the Texas Health Care Information Council. Data from 1999 and 2002 was used to capture variation in competitive conditions during a time of relative hospital antitrust inactivity. In 2000 and 2001, 19 hospitals in Texas and 18 hospitals in Florida were acquired by or divested from hospital systems, changing the competitive conditions in many markets in both states.[15] Only private short-term general acute-care hospitals that served at least 100 uninsured inpatients in each year and reported inpatient charity care and uninsured revenue amounts for both years are included in the inpatient analyses.[16] There are 120 such hospitals in Florida and 114 such hospitals in Texas.[17]

Three dependent variables are used in this analysis. As a direct measure of the price paid by uninsured patients (and an indirect measure of the charity care provided by a hospital), I use the net inpatient revenue per admission for self-paying patients. This price is net of charity care and bad debt. This is denoted as the self-pay price. As a direct measure of charity care, I use total inpatient charity care and bad debt charges multiplied by the hospital's cost-to-charge ratio.[18] This is denoted as inpatient uncompensated care cost. There are important differences between these amounts that should be kept in mind when interpreting the results. First, the self-pay price not only captures the price paid by uninsured patients receiving charity care and those who fail to pay the full amount owed (i.e., bad debt), it also reflects the prices paid by uninsured patients who paid their medical bill in full. The impact of changes in competition on these latter patients is not measured with inpatient uncompensated care cost. Second, inpatient uncompensated care cost not only captures the charity care and bad debt of uninsured patients, but also captures

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[15] Appendix B lists the hospital acquisitions and divestitures in both states.

[16] All short-term general acute-care hospitals (including cardiac, pediatric, orthopedic, oncology, and surgery specialty hospitals) are included in the calculation of the SSHHI, even if they did not meet the criteria above regarding uninsured patients and charity care.

[17] For the outpatient analysis, private short-term general acute-care hospitals that reported positive outpatient charity care amounts for both years were included even if the number of inpatient cases was less than 100. There are 128 such hospitals in Florida and 128 such hospitals in Texas.

[18] The cost-to-charge ratio is applied to avoid measuring "increases" in charity care that are only driven by increases in the hospital's list prices.

charity care granted to insured patients (such as those with high co-pays and deductibles) and the bad debt associated with insured patients who do not pay their full co-insurance. Thus, the two measures provide insight into competition's impact on slightly different patient populations.

The third dependent variable analyzed is outpatient uncompensated care cost which is outpatient charity care and bad debt multiplied by the hospital's cost to charge ratio. Some have found evidence that hospitals adjust outpatient charity care at a different rate than inpatient charity care. This may be due to regulations that make it easier for a hospital to reduce services to uninsured outpatients than inpatients (e.g., emergency patients must at least be stabilized before transfer regardless of ability to pay, while non-emergency patients may be required to show proof of insurance or post partial payment before treatment). Thus, it is possible that the effect of competition on charity care could be stronger for outpatients than inpatients.

Competition is measured using the system-specific Herfindahl-Hirschman Index (SSHHI). The most common measure of hospital competition used in previous studies is the Herfindahl-Hirschman Index (HHI): the sum of the squares of the market shares for the firms in the market. The primary problem with the HHI is that it is obviously very sensitive to market definition. Previous studies using the HHI have defined the market using political boundaries (e.g., counties and MSAs) or radii from the hospital. While these market definitions are empirically convenient, they may be a poor proxy for the competition actually faced by a hospital, since they incorporate no information about patient preferences. The most widely used method of market definition in hospital antitrust cases–the Elzinga-Hogarty test, which is based on patient flows–has also been shown to be inaccurate in defining hospital markets, particularly in large urban areas.[19]

Given these problems, some researchers (including Gruber (1994)) have employed a variant of the HHI, which I will denote as the System-Specific HHI (SSHHI), to study hospital competition. The SSHHI is calculated by first dividing patients into groups and calculating the HHI for each group. For each hospital system, the SSHHI is then the weighted average of all of the micro-HHIs, where the weights are based on the importance of each patient group to that

[19] For instance, see Capps et al. (2002).

hospital system. This measure correctly reflects the fact that hospital systems face different levels of competition depending on the competition they face for each of the groups of patients they serve.[20] Capps and Dranove (2004) employ the SSHHI to show that mergers of competing hospitals often lead to higher managed care prices.

For this project, I used patient groups based on zip codes and the classifications of Diagnosis Related Groups (DRGs) used in Town and Vistnes (2001) which reflect general categories of resource use.[21] Zip code and diagnosis-based patient groups are used to reflect the importance of distance in a patient's choice of hospital and the fact that patients are generally willing to travel farther for more complex diagnoses. The four Town and Vistnes (2001) DRG groups are used instead of the roughly 500 DRGs to insure a sufficient sample size in each patient group.

Suppose there are M zip codes in the state. Define patient group zk as the patients from zip code z with diagnosis in group k. Each hospital system h serves a share s_h^{zk} of the patient's in this group, equal to the patients in zk who go to system h divided by the total number of patients in zk. Of each hospital system's patients, the share ρ_h^{zk} come from group zk. (Thus, the sum of ρ_h^{zk} over all groups zk equals 1.) If there are N hospital systems in the state, the SSHHI for system h is:

(10) $$SSHHI_h = \sum_{z=1}^{M} \sum_{k=1}^{4} \rho_h^{zk} \sum_{h=1}^{N} (s_h^{zk})^2$$

A hospital system that is the sole provider in all groups from which it takes patients would have a

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[20] Despite this, the SSHHI is still based on the HHI measure of competition, which some have argued does not accurately reflect competition in differentiated markets like that for hospital services. Currently, some alternate measures of hospital competition are being developed (e.g., Antwi, Gaynor, and Vogt (2006)) that are based on structural models of hospital competition. A natural extension of the current analysis would be to use these new measures, once developed, as a substitute for the SSHHI.

[21] Group 1: DRGs with a weight $\geq$ 2; Group 2: DRGs with a weight $\geq$ 1.27 and < 2; Group 3: DRGs with a weight $\geq$ 0.91 and < 1.27; Group 4: DRGs with a weight < 0.91. DRG weights are defined using the contemporaneous fiscal year definitions found in the Federal Register.

SSHHI of 1.[22]

In addition to the possible effect of competition, changes in the costs of treating uninsured patients (and general hospital costs as well) can affect charity care and the price charged to uninsured patients. To control for changes in cost associated with shifts in the mix of diagnoses seen by the hospital, I include the change in the case mix index (i.e., the average DRG weight) for self-paying patients as an independent variable in the inpatient regressions.[23] I also use the change in the mean hourly wage for healthcare practitioners and technical occupations (e.g., nurses, lab technicians, etc.) from the Bureau of Labor Statistics' Occupational Employment Statistics as a proxy for general changes in hospital costs.

Charity care and the price charged to uninsured patients will also change with the demand for hospital services from uninsured patients. I use two sets of variables to capture changes in this demand. First, I use the change in the number of people below the poverty level in the hospital's

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[22] The SSHHI is a system-specific measure of competition; i.e., it is the same for all of the hospitals in a system. Most managed care contracts that involve system hospitals are negotiated by the system, so a system-based measure of competition is probably the most accurate representation of competition. However, it is possible that individual hospitals within a system may negotiate their own contracts in some cases or, more likely, that the individual competitive strengths and weaknesses of hospitals within a system may be reflected in the prices negotiated by the system for each hospital. A variant of the SSHHI that would capture this possibility involves weights ρ that are based on the zip code/diagnosis group's importance to each hospital and not its importance to the system overall. (Under this variant, the shares, s, within each zip code/diagnosis group are still calculated at the level of the system.) Using this hospital/system variant of the HHI in the analysis of uncompensated care and the self-pay price produces competition coefficients that are slightly smaller, but no change in the qualitative results. I am thankful to both Gloria Bazzoli and Cory Capps for suggesting this alternate approach.

[23] The case mix index only reflects inpatient resource use, so it is not included in the outpatient analyses. There currently exists no outpatient classification system analogous to DRGs, so measures of resource use analogous to the case mix index are not possible for outpatient cases. The closest system is the Medicare Ambulatory Payment Classification (APC) which is the basis of Medicare's outpatient prospective payment system. It is not feasible to use these to case mix adjust outpatient visits because an outpatient visit can have more than one APC. In any event, visit-specific outpatient data is not available publicly, so an outpatient index could not be constructed even if it were possible to do so. For this reason, one should interpret the outpatient results with care.

county as a proxy for changes in the demand for charity care. Since those below the poverty level usually qualify for Medicaid, this change may not closely track the change in the demand for charity care. Therefore, I also use the change in the median household income of the hospital's county and the change in the county's population as proxies for the change in the demand for charity care. In addition, a dummy variable for teaching hospitals is included to account for the possibility that changes in charity care may be different at these hospitals than at non-teaching hospitals. Since public hospitals are often the primary safety net hospitals for the poor and uninsured, with objectives that are much different than private (for or non-profit) hospitals, public hospitals are not included in the sample. Some previous research[24] suggests that private hospitals may benefit by seeing fewer uninsured patients when they are near public hospitals, so the number of public hospitals in the private hospital's county is included as an independent variable to capture this potential effect. I also include a dummy variable for hospitals that changed their type of ownership (e.g., for-profit to non-profit) between 1999 and 2002. Table 1 presents summary statistics of the Florida data and Table 2 presents summary statistics of the Texas data. All (non-dummy, non-count) variables are transformed into logs before differencing.

4. Results

The estimated coefficients and standard errors are presented in tables 3 through 10. Tables 3 through 5 present the primary results for Florida. Overall, there seems to be little relationship between competition and charity care in Florida. There is a relationship among non-profit hospitals indicating that reduced competition is associated with higher prices for the uninsured, but this relationship is only marginally statistically significant. (Recall, competition is inversely proportional to the SSHHI measure.)

The relationship between competition and the price charged to uninsured patients is stronger in Texas, as seen in table 6. Reduced competition is associated with significantly higher prices for the uninsured. The estimated coefficients on the change in SSHHI imply that a 10% increase in the SSHHI for a for-profit system is associated with a 46-54% increase in the

[24] Frank and Salkever (1991)

uninsured price. The analogous price increase for a non-profit system is 37-44%. When inpatient uncompensated care is used as a measure (Table 7), there is no evidence of a relationship between competition and charity care for non-profit hospitals. Among for-profit hospitals, reduced competition leads to reduced charity care. As in Florida, there does not seem to be a relationship between competition and outpatient uncompensated care (Table 8).

Tables 9 and 10 focus on the hospitals that experienced significant changes in their competitive environments between 1999 and 2002. While there were many mergers and divestitures in both states in 2000 and 2001–creating the change in concentration needed for estimation–there were many hospitals that experienced little change in competition.[25] One could argue that including these hospitals in the analysis could mask the effect of competition changes on charity care, which may only be present when competition changes significantly. To investigate this, I replicated the analysis excluding all hospitals that experienced an SSHHI change less than 0.0025 in absolute value.[26] The results for Florida are given in Table 9 and those for Texas are given in Table 10. These results are consistent with the previous results for all hospitals: reductions in competition lead to higher prices for the uninsured in Texas, but otherwise, there is little relationship between competition and charity care.

Of particular note in all of these results is the complete lack of support for the "cross-subsidization hypothesis:" that hospitals use increased market power to fund more charity care or, stated in the negative, that increased competition will harm patients who rely on charity care. Of the 32 sets of estimates presented in Tables 3 through 10, none provide support for this hypothesis.

The result that reduced competition leads to higher prices for uninsured patients (which is strongest in Texas) juxtaposed against the general lack of a relationship between competition and uncompensated care costs may reflect the slightly different patient populations covered by these two measures. Since the self-pay price captures the uninsured who pay their entire bill, while

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[25] Appendix C contains information about the distribution of the change in the SSHHI.

[26] For-profit and non-profit hospitals were pooled for this analysis to insure sufficient degrees of freedom.

uncompensated care cost captures even the insured who are granted charity care, uncompensated care cost likely better measures the services provided to the poor. The effect of reduced hospital competition on the uninsured who do not qualify for charity care and pay in full may be similar to the previously studied effect of reduced competition on managed care patients.

The existence of a relationship between competition reductions, self-pay price increases, and charity care reductions (at least among for-profit hospitals) in Texas, but largely not in Florida is somewhat puzzling at first since Florida, and not Texas, has certificate of need regulations restricting hospital entry. Initially, one would think that changing concentration levels would have more of an effect on prices in states with entry restrictions as merging hospitals could take advantage of market power with less fear of nearby entry. However, this logic may not apply to charity care. Some have argued that the entry of specialty hospitals near general acute-care hospitals largely shuts off the cross-subsidization mechanism supporting charity care since specialty hospitals often siphon off the most profitable insured patients.[27] No state has seen more entry of specialty hospitals in recent years than Texas.[28] Thus, it is possible that the lack of any relationship between competition and charity care in Florida reflects the balance between the cross-subsidization mechanism (in which increased competition leads to reduced charity care) and the price discrimination mechanism (in which increased competition leads to lower prices to the uninsured and increased charity care). In Texas, with the entry and presence of many specialty hospitals, the cross-subsidization mechanism may be reduced leaving only the price discrimination mechanism which, as theory predicts, is stronger among for-profit hospitals.

5. Conclusions and Further Work

Overall, with the exception of Texas for-profit hospitals, there seems to be little evidence of a relationship between competition and charity care. For Texas for-profit hospitals, increased concentration (i.e., reduced competition) is associated with reduced charity care. There is some evidence (strongest in Texas) that reduced competition may lead to higher prices for uninsured

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[27] For instance, Guterman (2006)

[28] See MEDPAC (2005), Figure 1

patients. Most noticeable in all of the results is the lack of any statistically significant evidence for the cross-subsidization hypothesis. The data provides no statistically significant evidence that increased competition leads to reductions in charity care. The claim that hospitals will use market power to increase services to the poor is largely unsupported by this data.

The results also highlight the need for further work to study the relationship between competition and hospital charity care. A number of new competition measures, such as the LOCI measure of Antwi, Gaynor, and Vogt (2006), are currently being developed and may prove to be better measures of hospital competition than the SSHHI. A natural extension of the current analysis would be to use these new measures, once developed, as a substitute for the SSHHI.

The difference between the Texas and Florida results highlights another potentially useful area for further study. The speculation that the Texas results may be due to specialty hospital entry could be explored by looking at the charity care of general acute care hospitals near newly entered specialty hospitals and comparing this with the charity care of general acute care hospitals unaffected by specialty hospital entry.

Table 1: Florida Data

Variable	*Mean*	*Std. Dev.*	*Min*	*Max*
self_pay_price99	$12,834	$5,865	$1,664	$43,731
self_pay_price02	$18,586	$7,659	$2,865	$49,676
ip_uncompensated_care_costs99	$3,778,725	$5,617,764	$424,037	$35,857,684
ip_uncompensated_care_costs02	$4,709,172	$6,279,731	$470,258	$40,291,552
op_uncompensated_care_costs99	$2,175,541	$2,515,758	$114,528	$16,358,652
op_uncompensated_care_costs02	$2,574,117	$2,925,200	$182,395	$20,382,064
self_pay_cases99	648	630	101	3,974
self_pay_cases02	738	853	102	7,658
profit	0.542	0.5	0	1
public_num	1	2	0	7
teach	0.033	0.18	0	1
type_change	0.017	0.129	0	1
rural	0.133	0.341	0	1
cmi_selfpay99	1.038	0.196	0.546	1.741
cmi_selfpay02	1.026	0.184	0.508	1.562
sshhi99	0.4167	0.072	0.2414	0.7154
sshhi02	0.4175	0.0686	0.2629	0.7133
poverty99	103,616	121,404	3,205	409,371
poverty02	113,997	131,329	3,102	441,160
medhhinc99	$36,258	$4,324	$26,869	$48,732
medhhinc02	$37,566	$5,087	$27,191	$51,587
pop99	769,806	690,606	19,467	2,220,961
pop02	809,314	722,653	19,347	2,314,547
wage99	$21.87	$1.99	$15.35	$27.92
wage02	$25.40	$1.91	$20.57	$30.46

Table 2: Texas Data

Variable	*Mean*	*Std. Dev.*	*Min*	*Max*
self_pay_price99	$8,739	$7,699	$327	$61,002
self_pay_price02	$10,729	$8,243	$247	$35,850
ip_uncompensated_care_costs99	$5,657,788	$5,576,786	$234,765	$27,392,992
ip_uncompensated_care_costs02	$7,170,062	$7,328,557	$263,015	$42,070,748
op_uncompensated_care_costs99	$2,402,253	$2,363,079	$121,641	$9,500,852
op_uncompensated_care_costs02	$3,304,291	$3,594,562	$85,568	$21,161,774
self_pay_cases99	712	512	104	2,606
self_pay_cases02	739	565	121	3,059
profit	0.395	0.491	0	1
public_num	1	1	0	2
teach	0.228	0.421	0	1
type_change	0.035	0.185	0	1
rural	0.158	0.366	0	1
cmi_selfpay99	1.017	0.245	0.526	1.850
cmi_selfpay02	1.051	0.264	0.283	2.200
sshhi99	0.3981	0.0722	0.2688	0.6253
sshhi02	0.3969	0.0758	0.1878	0.6254
poverty99	131,186	149,121	2,474	466,931
poverty02	148,689	169,302	2,895	520,702
medhhinc99	$37,927	$9,171	$22,746	$73,775
medhhinc02	$39,269	$9,551	$24,449	$75,866
pop99	958,205	1,100,446	21,878	3,359,671
pop02	1,009,969	1,155,106	21,892	3,540,254
wage99	$20.92	$2.05	$16.08	$25.34
wage02	$25.30	$2.10	$19.57	$28.64

Table 3
State: Florida
Dependent Variable: Self-Pay Price Change

Variable	FOR-PROFIT		NON-PROFIT	
1999 SSHHI	-0.511***	-0.421***	-0.153	-0.158
	(0.093)	(0.075)	(0.170)	(0.142)
SSHHI Change	0.062	-0.030	1.826**	1.370*
	(0.591)	(0.740)	(0.777)	(0.805)
Self-Pay CMI Change	0.327	0.219	-0.366	-0.336
	(0.298)	(0.294)	(0.498)	(0.510)
CS Residual	-0.594***	-0.592***	-0.559***	-0.578***
	(0.138)	(0.138)	(0.142)	(0.155)
Wage Change	-0.030	0.085	1.143*	1.356*
	(0.302)	(0.300)	(0.660)	(0.776)
Poverty Change	-0.584		-0.283	
	(0.452)		(0.939)	
Population Change		0.108		0.375
		(0.902)		(1.672)
Median Income Change		0.109		-2.457
		(1.169)		(2.566)
Teach			-0.156	-0.152
			(0.399)	(0.398)
# of Pub. Hosp.	-0.007	-0.015	0.161***	0.147***
	(0.019)	(0.019)	(0.036)	(0.031)
Type Change			0.525**	0.411*
			(0.223)	(0.221)
N	65	65	55	55
F	36.792	30.599	19.034	20.795
R^2	0.785	0.778	0.618	0.605
Adj-R^2	0.759	0.747	0.543	0.518

Huber-White robust standard errors in parentheses
* p<.1; ** p<.05; *** p<.01

Table 4
State: Florida
Dependent Variable: Inpatient Uncompensated Care Cost Change

Variable	FOR-PROFIT		NON-PROFIT	
1999 SSHHI	-0.215	-0.193	-0.263	-0.131
	(0.130)	(0.164)	(0.165)	(0.126)
SSHHI Change	-0.299	0.092	0.581	0.259
	(1.281)	(1.193)	(0.928)	(1.117)
Self-Pay CMI Change	-0.509	-0.581	-0.396	-0.311
	(0.627)	(0.623)	(0.441)	(0.560)
CS Residual	-0.215***	-0.198***	-0.094	-0.099
	(0.077)	(0.072)	(0.082)	(0.088)
Wage Change	0.825	0.772	0.860	1.450**
	(0.499)	(0.536)	(0.525)	(0.568)
Poverty Change	-0.088		-1.627*	
	(0.689)		(0.841)	
Population Change		-0.662		0.004
		(2.550)		(1.602)
Median Income Change		1.585		-3.423
		(2.515)		(2.349)
Teach			-0.143	-0.112
			(0.119)	(0.159)
# of Pub. Hosp.	0.014	0.010	0.054	0.019
	(0.019)	(0.021)	(0.054)	(0.047)
Type Change			-0.253*	-0.478***
			(0.144)	(0.175)
N	65	65	55	55
F	14.493	12.448	5.641	4.141
R^2	0.519	0.518	0.424	0.436
Adj-R^2	0.461	0.450	0.311	0.311

Huber-White robust standard errors in parentheses
* p<.1; ** p<.05; *** p<.01

Table 5
State: Florida
Dependent Variable: Outpatient Uncompensated Care Cost Change

Variable	FOR-PROFIT		NON-PROFIT	
1999 SSHHI	0.080	0.100	-0.599***	-0.578***
	(0.137)	(0.158)	(0.218)	(0.214)
SSHHI Change	-2.036*	-1.936	0.203	1.223
	(1.107)	(1.200)	(0.993)	(1.181)
CS Residual	-0.153	-0.192*	-0.211	-0.249*
	(0.100)	(0.106)	(0.131)	(0.134)
Wage Change	1.429**	1.330**	-1.821*	-2.215***
	(0.639)	(0.632)	(1.015)	(0.812)
Poverty Change	0.989		-0.553	
	(0.732)		(0.886)	
Population Change		2.566		-2.206
		(2.296)		(2.754)
Median Income Change		-0.007		4.749**
		(1.838)		(2.291)
Teach			-0.188	-0.192*
			(0.151)	(0.109)
# of Pub. Hosp.	-0.068**	-0.063**	0.085*	0.104**
	(0.027)	(0.027)	(0.050)	(0.046)
Type Change			-0.962***	-0.797***
			(0.202)	(0.234)
N	67	67	61	61
F	4.691	4.066	94.325	62.639
R^2	0.312	0.317	0.356	0.390
Adj-R^2	0.245	0.237	0.259	0.285

Huber-White robust standard errors in parentheses
* p<.1; ** p<.05; *** p<.01

Table 6
State: Texas
Dependent Variable: Self-Pay Price Change

Variable	FOR-PROFIT		NON-PROFIT	
1999 SSHHI	-0.481*	-0.200	-0.153	-0.248
	(0.246)	(0.271)	(0.406)	(0.292)
SSHHI Change	4.520***	3.978***	3.327**	3.811***
	(0.636)	(0.728)	(1.293)	(1.313)
Self-Pay CMI Change	1.957**	1.858*	1.047***	1.022***
	(0.960)	(0.925)	(0.345)	(0.326)
CS Residual	-0.664***	-0.686***	-0.480***	-0.484***
	(0.179)	(0.180)	(0.140)	(0.144)
Wage Change	0.056	-0.119	-0.174	-0.378
	(1.161)	(1.283)	(1.436)	(1.334)
Poverty Change	-0.461		-0.838	
	(0.490)		(1.572)	
Population Change		-0.557		-3.469
		(0.849)		(3.844)
Median Income Change		6.688*		0.692
		(3.896)		(4.508)
Teach	-0.332	-0.315	-0.127	-0.154
	(0.672)	(0.664)	(0.211)	(0.230)
# of Pub. Hosp.	-0.062	-0.004	-0.024	-0.032
	(0.149)	(0.155)	(0.131)	(0.145)
Type Change	-0.118	-0.028		
	(0.309)	(0.310)		
N	45	45	69	69
F	82.050	65.290	5.810	5.844
R^2	0.558	0.585	0.318	0.326
Adj-R^2	0.447	0.466	0.228	0.224

Huber-White robust standard errors in parentheses
* p<.1; ** p<.05; *** p<.01

Table 7
State: Texas
Dependent Variable: Inpatient Uncompensated Care Cost Change

Variable	FOR-PROFIT		NON-PROFIT	
1999 SSHHI	-0.535**	-0.403*	-0.197	-0.163
	(0.199)	(0.199)	(0.246)	(0.174)
SSHHI Change	-0.656**	-1.076***	0.918	0.841
	(0.313)	(0.346)	(1.325)	(1.301)
Self-Pay CMI Change	-0.232	-0.326	0.116	0.126
	(0.391)	(0.416)	(0.315)	(0.329)
CS Residual	0.026	0.030	-0.130	-0.127
	(0.113)	(0.113)	(0.153)	(0.156)
Wage Change	-1.567	-1.630*	-0.127	-0.128
	(1.034)	(0.823)	(0.783)	(0.753)
Poverty Change	0.710**		0.176	
	(0.335)		(0.714)	
Population Change		1.259**		1.526
		(0.617)		(1.516)
Median Income Change		2.887		-0.459
		(2.009)		(2.502)
Teach	-0.047	-0.014	-0.218	-0.204
	(0.132)	(0.131)	(0.146)	(0.154)
# of Pub. Hosp.	0.103*	0.155**	0.089	0.084
	(0.060)	(0.062)	(0.060)	(0.068)
Type Change	0.007	0.121		
	(0.192)	(0.199)		
N	45	45	69	69
F	1028.627	303.555	3.329	3.050
R^2	0.670	0.699	0.208	0.207
Adj-R^2	0.588	0.613	0.104	0.089

Huber-White robust standard errors in parentheses
* p<.1; ** p<.05; *** p<.01

Table 8
State: Texas
Dependent Variable: Outpatient Uncompensated Care Cost Change

Variable	FOR-PROFIT		NON-PROFIT	
1999 SSHHI	-0.558***	-0.428**	-0.025	0.085
	(0.152)	(0.166)	(0.194)	(0.202)
SSHHI Change	-0.051	-0.417	0.050	-0.187
	(0.230)	(0.250)	(1.697)	(1.584)
CS Residual	-0.033	-0.044	-0.205	-0.220
	(0.084)	(0.090)	(0.145)	(0.143)
Wage Change	-1.109	-1.232*	1.501*	1.235
	(0.792)	(0.676)	(0.897)	(0.914)
Poverty Change	0.327		-0.282	
	(0.352)		(0.774)	
Population Change		0.446		1.636
		(0.618)		(1.662)
Median Income Change		3.475*		1.685
		(1.749)		(2.908)
Teach	-0.128	-0.103	-0.161	-0.135
	(0.149)	(0.145)	(0.183)	(0.191)
# of Pub. Hosp.	0.096**	0.149**	0.049	0.046
	(0.047)	(0.057)	(0.058)	(0.064)
Type Change	-0.045	0.057		
	(0.126)	(0.126)		
N	51	51	77	77
F	32.133	29.391	5.330	4.970
R^2	0.692	0.720	0.278	0.301
Adj-R^2	0.635	0.661	0.206	0.220

Huber-White robust standard errors in parentheses
* p<.1; ** p<.05; *** p<.01

Table 9
State: Florida
Dependent Variables: Self-Pay Price Change & Inpatient Uncompensated Care Cost Change
Excluding hospitals with |(SSHHI Change)*10,000|<25

Variable	Self-Pay Price Change		IP Uncomp. Care Cost Change	
1999 SSHHI	-0.144	-0.077	-0.304*	-0.155
	(0.197)	(0.172)	(0.179)	(0.166)
SSHHI Change	0.658	-0.399	0.047	-0.243
	(0.558)	(0.861)	(0.802)	(0.929)
Self-Pay CMI Change	-0.069	0.048	-0.592	-0.760
	(0.453)	(0.395)	(0.467)	(0.556)
CS Residual	-0.648***	-0.672***	-0.103	-0.107
	(0.099)	(0.093)	(0.080)	(0.087)
Wage Change	1.553**	2.084**	0.840	1.016
	(0.748)	(0.803)	(0.646)	(0.750)
Poverty Change	0.129		-1.584	
	(0.885)		(0.952)	
Population Change		2.143		-0.470
		(1.964)		(2.235)
Median Income Change		-4.700		-0.976
		(2.941)		(3.158)
Teach	-0.293	-0.242	-0.047	0.016
	(0.524)	(0.445)	(0.129)	(0.159)
# of Pub. Hosp.	0.002	0.002	-0.013	-0.026
	(0.033)	(0.030)	(0.025)	(0.031)
Type Change	0.244	0.050	-0.325**	-0.437**
	(0.198)	(0.218)	(0.152)	(0.177)
Profit	0.011	0.064	0.244*	0.265*
	(0.110)	(0.117)	(0.139)	(0.147)
N	55	55	55	55
F	15.020	15.147	9.170	7.312
R^2	0.664	0.682	0.546	0.523
Adj-R^2	0.589	0.602	0.445	0.403

Huber-White robust standard errors in parentheses
* p<.1; ** p<.05; *** p<.01

Table 10
State: Texas
Dependent Variables: Self-Pay Price Change & Inpatient Uncompensated Care Cost Change
Excluding hospitals with |(SSHHI Change)*10,000|<25

Variable	Self-Pay Price Change		IP Uncomp. Care Cost Change	
1999 SSHHI	-1.057**	-0.533*	-0.200	-0.167
	(0.397)	(0.276)	(0.233)	(0.226)
SSHHI Change	3.840***	3.136***	-0.106	-0.245
	(0.978)	(0.873)	(0.453)	(0.443)
Self-Pay CMI Change	0.831***	0.748***	-0.136	-0.151
	(0.167)	(0.145)	(0.127)	(0.143)
CS Residual	-0.588***	-0.635***	0.050	0.050
	(0.143)	(0.118)	(0.088)	(0.101)
Wage Change	-2.815*	-3.341***	-0.871	-0.808
	(1.435)	(1.114)	(1.116)	(1.134)
Poverty Change	-1.947*		0.635	
	(0.953)		(0.376)	
Population Change		-2.716**		1.607*
		(1.258)		(0.909)
Median Income Change		12.984***		-0.330
		(3.949)		(2.273)
Teach	-0.068	0.106	-0.492**	-0.460**
	(0.290)	(0.247)	(0.189)	(0.175)
# of Pub. Hosp.	-0.141	-0.025	0.207***	0.227***
	(0.173)	(0.136)	(0.066)	(0.078)
Profit	0.262	0.316	0.154	0.155
	(0.258)	(0.194)	(0.102)	(0.103)
N	38	38	38	38
F	38.947	44.217	15.953	11.950
R^2	0.763	0.818	0.580	0.594
Adj-R^2	0.689	0.753	0.450	0.449

Huber-White robust standard errors in parentheses
* p<.1; ** p<.05; *** p<.01

Appendix A: Data and Variable Construction

Florida:

Hospital Universe:[29]

All short-term general acute care (hospital type = A or D) hospitals in the state of Florida operating between 1999 and 2002, excluding the following:

1. Hospitals in the Hill-Burton program in 1999 or 2002 (i.e., hospitals that list positive Hill-Burton inpatient deductions in 1999 or 2002).
2. Hospitals with fewer than 100 self-paying inpatients in 1999 or 2002.
3. Hospitals for which financial information is not available.
4. Hospitals that listed no revenue from self-paying inpatients or no bad debt or charity care for inpatients in 1999 or 2002.

Note: All short-term general acute care hospitals are included in the calculation of the SSHHI, even if they do not satisfy 1-4.

Variables: (XX = 99, 02)

Name	Description	Source
self_pay_priceXX	(net inpatient revenue for self-paying patients)/(self-paying inpatient cases)	Florida Hospital Financial Data, Florida Agency for Health Care Administration (AHCA)
ip_uncompensated_care_costsXX	(deductions for inpatient bad debt + deductions for inpatient charity care)*(total operating expenses/total gross revenues)	Florida Hospital Financial Data, AHCA
op_uncompensated_care_costsXX	(deductions for outpatient bad debt + deductions for outpatient charity care)*(total operating expenses/total gross revenues)	Florida Hospital Financial Data, AHCA
sshhiXX	weighted average Herfindahl-Hirschman Index for insured patients (unique to each hospital system)	Florida Hospital Inpatient Data, AHCA
systemXX	owner of the hospital	Florida Hospital Financial Data, AHCA and the AHA Guide to Hospitals, 1999-2000 and 2002-2003 editions

[29] For inpatient only; see footnote 19 for outpatient hospital universe.

cmi_selfpayXX	Case Mix Index for self-paying patients	Florida Hospital Inpatient Data, AHCA and the Federal Register
profit	=1 if the hospital is investor-owned in 1999, else = 0	Florida Hospital Financial Data, AHCA
public_num	number of public hospitals in the hospital's county	Florida Hospital Financial Data, AHCA
teach	= 1 if the hospital is a teaching hospital in 1999, else = 0	Florida Hospital Financial Data, AHCA
type-change	= 1if the hospital's ownership type changed between 1999 and 2002, else = 0	Florida Hospital Financial Data, AHCA
povertyXX	number of persons below the poverty level (unique to each county)	Small Area Income and Poverty Estimates, U.S. Census Bureau
medhhincXX	median household income (unique to each county)	Small Area Income and Poverty Estimates, U.S. Census Bureau
popXX	population (unique to each county)	U.S. Census Bureau
wageXX	mean hourly wage, healthcare practitioners and technical occupations (unique to each MSA) (For Ocala MSA, mean hourly wage of registered nurses used; For rural areas, statewide mean hourly wage for healthcare practitioners and technical occupations used)	Occupational Employment Statistics, Bureau of Labor Statistics
rural	=1 if the hospital is not located in an MSA	Florida Hospital Financial Data, AHCA

Texas:

Hospital Universe:[30]

All short-term general acute care hospitals in the state of Texas operating between 1999 and 2002, excluding the following:

1. Hospitals with fewer than 100 self-paying inpatients in 1999 or 2002.
2. Hospitals for which financial information is not available.
3. Hospitals that listed no revenue from self-paying inpatients or no bad debt or charity care for inpatients in 1999 or 2002.

Note: All short-term general acute care hospitals are included in the calculation of the SSHHI, even if they do not satisfy 1-4.

Variables: (XX = 99, 02)

Name	Description	Source
self_pay_priceXX	[(net revenue for self-paying patients)*(inpatient gross revenue/total gross revenue)]/(self-paying inpatient cases)	Texas Department of Health, Annual Survey of Hospitals
ip_uncompensated_care_costsXX	[(deductions for bad debt + deductions for charity care)*(inpatient gross revenue/total gross revenue)]*(total operating expenses/total gross revenues)	Texas Department of Health, Annual Survey of Hospitals
op_uncompensated_care_costsXX	[(deductions for bad debt + deductions for charity care)*(outpatient gross revenue/total gross revenue)]*(total operating expenses/total gross revenues)	Texas Department of Health, Annual Survey of Hospitals
sshhiXX	weighted average Herfindahl-Hirschman Index for insured patients (unique to each hospital system)	Texas Health Care Information Council, Hospital Inpatient Discharge Public Use Data File

[30] For inpatient only; see footnote 19 for outpatient hospital universe.

systemXX	owner of the hospital	Texas Department of Health, Annual Survey of Hospitals and the AHA Guide to Hospitals, 1999-2000 and 2002-2003 editions
cmi_selfpayXX	Case Mix Index for self-paying patients	Texas Health Care Information Council, Hospital Inpatient Discharge Public Use Data File and the Federal Register
profit	=1 if the hospital is investor-owned in 1999, else = 0	Texas Department of Health, Annual Survey of Hospitals
public_num	number of public hospitals in the hospital's county	Texas Department of Health, Annual Survey of Hospitals
teach	= 1 if the hospital is a teaching hospital in 2002, else = 0	AHA Guide to Hospitals, 2002-2003
type-change	= 1if the hospital's ownership type changed between 1999 and 2002, else = 0	Texas Department of Health, Annual Survey of Hospitals
povertyXX	number of persons below the poverty level (unique to each county)	Small Area Income and Poverty Estimates, U.S. Census Bureau
medhhincXX	median household income (unique to each county)	Small Area Income and Poverty Estimates, U.S. Census Bureau
popXX	population (unique to each county)	U.S. Census Bureau

wageXX	mean hourly wage, healthcare practitioners and technical occupations (unique to each MSA) (For Victoria MSA, mean hourly wage of registered nurses used; For Galveston PMSA, mean hourly wage for Houston used; For rural areas, statewide mean hourly wage for healthcare practitioners and technical occupations used)	Occupational Employment Statistics, Bureau of Labor Statistics
rural	=1 if the hospital is not located in an MSA	Texas Department of Health, Annual Survey of Hospitals

Appendix B: Hospital Changes in Ownership in 2000 and 2001

Florida:

Hospital	*1999 Owner*	*2002 Owner*
HELEN ELLIS MEMORIAL HOSPITAL	HELEN ELLIS MEMORIAL HOSPITAL	UNIVERSITY COMMUNITY HOSPITAL
MEMORIAL HOSPITAL FLAGLER	MEMORIAL HEALTH	ADVENTIST
MEMORIAL HOSPITAL ORMAND BEACH	MEMORIAL HEALTH	ADVENTIST
PASCO REGIONAL MEDICAL CENTER	HCA	HEALTH MANAGEMENT ASSOCIATES
PUTNAM COMMUNITY MEDICAL CENTER	HCA	LIFEPOINT
WINTER PARK MEMORIAL HOSPITAL	HCA	ADVENTIST
GOOD SAMARITAN MEDICAL CENTER	CATHOLIC HEALTH EAST	TENET
ST MARY'S MEDICAL CENTER	CATHOLIC HEALTH EAST	TENET
DEERING HOSPITAL	HCA	JACKSON MEMORIAL HOSPITAL
EAST POINTE HOSPITAL	HCA	HEALTH MANAGEMENT ASSOCIATES
BARTOW REGIONAL MEDICAL CENTER	HCA	LIFEPOINT
BAYFRONT MEDICAL CENTER	CATHOLIC HEALTH EAST	BAYFRONT MEDICAL CENTER
CALHOUN-LIBERTY HOSPITAL	CENTENNIAL HEALTHCARE	DASSEE COMMUNITY
CLEVELAND CLINIC HOSPITAL	CLEVELAND CLINIC	TENET
GADSDEN COMMUNITY HOSPITAL	CENTENNIAL HEALTHCARE	DASSEE COMMUNITY
GEORGE E. WEEMS MEMORIAL HOSPITAL	CENTENNIAL HEALTHCARE	DASSEE COMMUNITY
SANTA ROSA MEDICAL CENTER	PARACELSUS HEALTHCARE	HEALTH MANAGEMENT ASSOCIATES
SUN COAST HOSPITAL	SUN COAST HOSPITAL	UNIVERSITY COMMUNITY HOSPITAL

Texas:

Hospital	*1999 Owner*	*2002 Owner*
Tri-City Community Hospital	Tri-City Community Hospital	COMMUNITY HEALTH SYSTEMS
Dallas Southwest Medical Center	HCA	Dallas Southwest Medical Center
Garland Community Hospital	TENET	LELAND MEDICAL
Medical Center at Lancaster	HCA	AMERICAN MEDTRUST
St. Paul Medical Center	TEXAS HEALTH RESOURCES	UNIVERSITY HOSPITALS HEALTH SYSTEM
The Medical Center of Mesquite	PARACELSUS	HEALTH MANAGEMENT ASSOCIATES
Zale Lipshy University Hospital	Zale Lipshy University Hospital	UNIVERSITY HOSPITALS HEALTH SYSTEM
Denton Community Hospital	NETCARE HEALTH SYSTEMS	TRIAD
Community Medical Center - Sherman	TRIAD	WILSON N JONES REGIONAL HEALTH SYSTEM
BayCoast Medical Center	PARACELSUS	METHODIST HEALTH CARE SYSTEM
Bellaire Medical Center	HCA	AMERICAN MEDTRUST
McAllen Heart Hospital	MEDCATH	UNIVERSAL HEALTH
McCuistion Regional Medical Center	TEXAS HEALTH RESOURCES	CHRISTUS HEALTH
Fort Duncan Medical Center	Fort Duncan Medical Center	UNIVERSAL HEALTH
Westwood Medical Center	PARACELSUS	Midland Memorial Hospital
North Bay Hospital	HCA	AMERICAN MEDTRUST
Memorial Hospital of Center	NEW AMERICAN HEALTHCARE	TENET
All Saints Episcopal Hospital/Cityview	ALL SAINTS HEALTH	BAYLOR HEALTH CARE SYSTEM
All Saints Episcopal Hospital/Fort Worth	ALL SAINTS HEALTH	BAYLOR HEALTH CARE SYSTEM

Appendix C: Distribution of the Change in the SSHHI[31]

Florida:

	Percentiles	Smallest		
1%	-509.9277	-604.7535		
5%	-385.5595	-509.9277		
10%	-258.3593	-436.2939	Obs	120
25%	-19.28635	-416.8438	Sum of Wgt.	120
50%	-3.669012		Mean	7.343001
		Largest	Std. Dev.	226.8815
75%	4.965535	388.3898		
90%	388.3898	388.3898	Variance	51475.2
95%	388.3898	532.4691	Skewness	.6370806
99%	532.4691	979.685	Kurtosis	5.460507

Texas:

	Percentiles	Smallest		
1%	-230.3932	-1193.076		
5%	-42.64409	-230.3932		
10%	-37.41276	-230.3932	Obs	114
25%	-36.11901	-200.5257	Sum of Wgt.	114
50%	-3.96751		Mean	-11.90648
		Largest	Std. Dev.	146.0216
75%	0	52.07337		
90%	8.639013	360.1818	Variance	21322.31
95%	52.07337	360.1818	Skewness	-3.322726
99%	360.1818	730.0405	Kurtosis	45.04444

[31] The SSHHI has been multiplied by 10,000 for ease of interpretation.

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