Are Urban Safety-Net Hospitals Losing Low-Risk Medicaid Maternity Patients?

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Objective. To examine data on Medicaid and self-pay/charity maternity cases to address four questions: (1) Did safety-net hospitals' share of Medicaid patients decline while their shares of self-pay/charity-care patients increased from 1991 to 1994? (2) Did Medicaid patients' propensity to use safety-net hospitals decline during 1991–94? (3) Did self-pay/charity patients' propensity to use safety-net hospitals increase during 1991–94? (4) Did the change in Medicaid patients' use of safety-net hospitals differ for low- and high-risk patients?

Study Design. We use hospital discharge data to estimate logistic regression models of hospital choice for low-risk and high-risk Medicaid and self-pay/charity maternity patients for 25 metropolitan statistical areas (MSAs) in five states for the years 1991 and 1994. We define low-risk patients as discharges without comorbidities and high-risk patients as discharges with comorbidities that may substantially increase hospital costs, length of stay, or morbidity. The five states are California, Florida, Massachusetts, New Jersey, and New York. The MSAs in the analysis are those with at least one safety-net hospital and a population of 500,000 or more. This study also uses data from the 1990 Census and AHA Annual Survey of Hospitals. The regression analysis estimates the change between 1991 and 1994 in the relative odds of a Medicaid or self-pay/charity patient using a safety-net hospital. We explore whether this change in the relative odds is related to the risk status of the patient.

Principal Findings. The findings suggest that competition for Medicaid patients increased from 1991 to 1994. Over time, safety-net hospitals lost low-risk maternity Medicaid patients while services to high-risk maternity Medicaid patients and self-pay/charity maternity patients remained concentrated in safety-net hospitals.

Implications for Policy. Safety-net hospitals use Medicaid patient revenues and public subsidies that are based on Medicaid patient volumes to subsidize care for uninsured and underinsured patients. If safety-net hospitals continue to lose their low-risk Medicaid patients, their ability to finance care for the medically indigent will be impaired. Increased hospital competition may improve access to hospital care for low-risk Medicaid patients, but policymakers should be cognizant of the potential reduction in access to hospital care for uninsured and underinsured patients. Public policymakers should ensure that safety-net hospitals have sufficient financial resources to care for these patients by subsidizing their care directly.

Key Words. Safety-net hospitals, Medicaid, charity care, maternity patients, managed care, hospital competition

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Urban safety-net hospitals are an important source of health care for vulnerable population groups. They are the providers of last resort for the uninsured, the underinsured, legal and undocumented immigrants, racial and ethnic minorities, the homeless, the chronically ill and disabled, high-risk mothers and infants, victims of violence, the mentally ill, substance abusers, and prison populations (Gage 1998). In addition, safety-net hospitals are important providers of high-cost and potentially unprofitable services such as burn units, neonatal intensive care, inpatient pediatric care, trauma care, psychiatric care, and inpatient drug and alcohol dependency treatment (Gaskin 1999).

Safety-net providers and advocates for "vulnerable" populations are concerned that the growing presence of managed care in health care markets threatens the viability of safety-net hospitals. Managed care enrollment has grown substantially in the 1990s. Enrollment in health maintenance organizations (HMOs) increased 85 percent, from 36.5 million in 1990 to 67.5 million in 1996 (AAHP 1998). Enrollment in preferred provider organizations (PPOs) grew very rapidly from 38.1 million in 1990 to 97.8 million in 1996—a 257 percent increase (AAHP 1998). Medicaid and Medicare managed care have also increased dramatically in the 1990s. Medicaid managed care has been implemented in every state except Alaska and Wyoming. As of January 1998, more than 15.3 million Medicaid beneficiaries (47 percent) and six million Medicare beneficiaries (16 percent) were enrolled in managed care plans (HCFA 1998).

Financial support for this research was provided by The Commonwealth Fund, grant 96963, entitled "The Impact of Managed Care and Medicaid Payment Changes on Urban Safety-Net Hospitals—Phase II." The opinions expressed in this article are those solely of the authors and do not reflect the positions of Georgetown University or The Commonwealth Fund. We acknowledge the skillful computer programing of Andrew Epstein, M.P.P. and Qin Wang, M.A.

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Managed care growth has reduced the demand for hospital care in many urban areas (Feldman, Chan, Kralewski, et al. 1990; Melnick et al. 1992). To replace declining private patient admissions, hospitals that historically did not serve Medicaid patients may find them a much more attractive source of revenue. Traditional safety-net hospitals—large public hospitals and major teaching hospitals—have complained that other urban hospitals not only erode their patient base but also "cream skim"—serve profitable low-risk Medicaid patients while avoiding unprofitable high-risk Medicaid and uninsured patients. By risk, we are referring to the amount of hospital resources required to treat a patient. High-risk patients, because of their concomitant conditions, require more tests, more procedures, and longer stays. If Medicaid's payment system does not adequately adjust for these risks, hospitals could lose money on high-risk Medicaid patients.

Managed care penetration can adversely affect the patient volumes of safety-net hospitals in two ways. First, high levels of managed care penetration may increase the level of hospital competition for Medicaid patients. Financial pressures created by the lower hospital use of privately insured managed care patients and lower rates negotiated by managed care plans encourage hospitals to attract more Medicaid patients in order to maintain their census. As managed care plans bid down the reimbursement rates associated with privately insured patients, revenues from Medicaid patients become more attractive to all hospitals.

As a result, safety-net hospitals in high managed care penetration markets find themselves competing for patients they traditionally served by default. In California, a state with high managed care penetration, Medi-Cal, the state's Medicaid program, has become an attractive payer (Friedman 1997). Since 1991, safety-net hospitals in California have lost a significant number of Medi-Cal patients. In particular, other urban hospitals have sought low-risk Medi-Cal mothers and children to replace private patients siphoned off by managed care.

Initially, channeling of patients by managed care plans was limited to safety-net hospitals' private pay patients who make up only 20 percent of their patient census on average. However, with the recent growth of Medicaid managed care, safety-net hospitals could potentially lose their primary patient population—Medicaid patients, who comprise almost 48 percent of their patients. Advocates fear that safety-net hospitals across the nation will follow the experiences of the Regional Medical Center at Memphis and Meharry Medical College–Metropolitan Nashville General Hospital, which lost a substantial number of their Medicaid patients under TennCare, Tennessee's

Medicaid managed care program (Gage 1998; Meyer and Blumenthal 1996; Siegel 1996).

This study presents evidence from 1991 to 1994 of the potential competitive effect of overall managed care growth on urban safety-net hospitals. (We do not expect to see direct evidence of managed care plans channeling Medicaid patients away from urban safety-net hospitals until widespread implementation of Medicaid managed care in the mid- to late-1990s.) We investigated whether urban safety-net hospitals are losing their competition for Medicaid patients by examining data for Medicaid and self-pay/charity patient maternity cases to address the following questions:

- Did safety-net hospitals' shares of Medicaid patients decline while their shares of self-pay/charity-care patients increased during 1991–94?
- Did Medicaid patients' propensity to use urban safety-net hospitals decline during 1991–94?
- Did self-pay/charity patients' propensity to use urban safety-net hospitals increase during 1991–94?
- Did the change in Medicaid patients' use of safety-net hospitals differ for low- and high-risk patients?

To answer these questions, we tested whether the relative odds of Medicaid and self-pay/charity patients using an urban safety-net hospital changed between 1991 and 1994. Our test is based on models of individual patients' hospital use in 25 large metropolitan statistical areas (MSAs) in five states.

BACKGROUND

Hospital Competition and Medicaid Payments in the Study States

In the early 1990s, managed care plans began to negotiate lower payments to hospitals for their patients. ProPAC (1996) reports that hospitals' payments for private patients grew at a much slower rate than hospital charges for private patients. Prior to 1988, the private patients' payments and charges grew at similar rates. From 1991 to 1994, the differential between private payer charges and private payer payments grew from about 25 percent to over 40 percent. Correspondingly, private payer payments relative to private payer costs fell from 130 percent in 1991 to 124 percent in 1994. During the same time period, Medicaid payments as a percent of costs increased from

82 percent to 94 percent (ProPAC 1996). This improvement in Medicaid payments made Medicaid patients more attractive to all hospitals.

The five study states varied in the intensity of hospital price competition and the generosity of Medicaid payments to hospitals. In California, Florida, and Massachusetts, hospitals faced intense price competition in the early 1990s. Zuckerman, Coughlin, Nichols, et al. (1998) concluded that inpatient rates for all payers in California were the lowest in the country due to competition, selective contracting, and excess capacity. California's Medicaid program has selective contracts with a little over half of the state's hospitals to provide about 90 percent of the inpatient services to Medicaid patients (Zuckerman, Coughlin, Nichols, et al. 1998). Hospitals were paid on an individually negotiated per diem basis. Rates varied dramatically for hospitals located in the same vicinity. Lipson, Norton, and Dubay (1997) concluded that competition in Florida had driven down private rates to the point where Medicaid rates appeared good, *even though* the Medicaid program paid hospitals at rates that were 82 to 83 percent of costs.

The late 1980s and early 1990s was a period of tremendous change in the Massachusetts hospital market. Faced with deregulation, increased HMO competition, and reductions in Blue Cross–Blue Shield and Medicaid payments, the hospital industry reduced capacity through mergers, closures, and downsizing. Medicaid paid hospitals prospectively, also at a rate approximately 83 percent of costs (Holahan et al. 1997a).

Hospital price competition was restrained in New Jersey and New York because of their hospital rate-setting systems and extensive hospital regulations. New Jersey's Medicaid program reimbursed hospitals generously under its rate-setting system. Even after this system was dismantled in 1992, the state continued to supplement its Medicaid payments with adjustments to ease hospitals' transition to unregulated hospital rates (Bovbjerg et al. 1998). New York's rate-setting system remained in place throughout the study period. The New York Medicaid program also paid hospitals prospectively but was very generous, paying 101 percent of costs under their state's all-payer rate-setting system (Holahan et al. 1997b).

Identifying Safety-Net Hospitals

Safety-net hospitals have a demonstrated commitment to provide care to low income, special needs, and other vulnerable populations regardless of their ability to pay. These hospitals' safety-net mission stems from either a legal or historical obligation to care for indigent patients or an organizational commitment to meet the health care needs of vulnerable populations. For

the purposes of this study, safety-net hospitals are either members of the National Association of Public Hospitals and Health Systems (NAPH) or are hospitals where low income patients make up a high proportion of all discharges—more than 1 s.d. above the average proportion for all urban short-term general hospitals in their state in 1991. Most major metropolitan public or nonprofit hospitals with an explicit safety-net mission are NAPH members. These hospitals typically have a legal or historical obligation to serve all regardless of ability to pay or have a contract with local government to serve indigent patients. We use a "high" proportion of discharges by low-income (Medicaid and self-pay/charity) patients to identify other hospitals that serve as safety-net providers. (The cutoff for a high proportion of low-income discharges is state specific because Medicaid coverage and the percent of the uninsured population differ across states. See Appendix A for a description of safety-net hospitals.)

An important rationale for using the proportion of discharges by low-income patients to define safety-net hospitals is that federal, state, county, and city governments often use source of payment measures to determine whether hospitals qualify for public subsidies such as Medicaid and Medicare disproportionate share payments and local indigent care funding. However, our data do not permit us to calculate the exact formulae these federal and state programs use. Typically, public officials and policy analysts assume hospitals that serve high proportions of poor patients are important providers of care to poor communities. Recent studies demonstrate that this is a reasonable assumption (Gaskin and Hadley 1999; Fishman 1997).

Prior Studies of Hospital Choice

The empirical literature on hospital choice, summarized by Porell and Adams (1995), primarily identifies the effects of hospital attributes on market share or patient volume. Because we estimated individual choice models, we emphasize those studies, rather than analyses of hospitals' share of patients. All the studies found that patient distance is inversely related to the probability of choosing a hospital (Morrill and Earickson 1968; Morrill, Earickson, and Rees 1970; Shannon, Skinner, and Bashshur 1973; Studnicki 1975). Hospital size and the breadth of services, measured in a variety of ways, are positively related to the likelihood of being selected. Garnick, Lichtenberg, Phibbs, et al. (1989) and Burns and Wholey (1992) found that the volume of patient transfers or previous admissions from that patient's community increased the probability of choosing a hospital. Price has a negative effect on hospital

choice. Quality, as measured by better than expected rates of mortality, morbidity, and complication, usually had a positive effect on hospital choice.

Other studies have found that hospital choice differs by age, race, economic status, and diagnostic category (Cohen and Lee 1985; Burns and Wholey 1992; Phibbs, Mark, Luft, et al. 1993). The impact of patient attributes on hospital choice was estimated directly in disaggregate choice models. However, the results from these studies are difficult to summarize because of differences in how each defines the dependent variable and characterizes the choice set.

CONCEPTUAL FRAMEWORK

Medicaid and Self-Pay/Charity Patients' Hospital Choice

Theories of hospital choice are typically based on McFadden's (1974) stochastic choice theory, which combines utility maximization with discrete consumer choice. Patients are presented a set of hospitals from which they choose. This choice set is determined in part by patients' location. Patients choose hospitals that maximize their utility from the choice set. Patients' utility functions depend on patient attributes such as race, ethnicity, age, type and severity of illness, education level, and income level. These patient attributes determine how patients evaluate hospitals.

In making their selection, patients consider a number of hospital characteristics, such as price, quality, amenities, and proximity, which are derived from a standard demand analysis. Patients are more likely to select hospitals that have lower prices, higher quality, and better amenities. Patients also prefer hospitals that are closer to their homes.

For persons who have no insurance or who may be eligible for Medicaid or another indigent care program, the hospital's perceived safety-net status is also a factor. Safety-net hospitals are more likely to offer free care and help eligible persons apply for Medicaid and other indigent care programs. For Medicaid patients, the dollar price of care is irrelevant, although the ease of receiving care may still be important. All things being equal, Medicaid patients may prefer nearby hospitals that will admit them without any financial hassle.

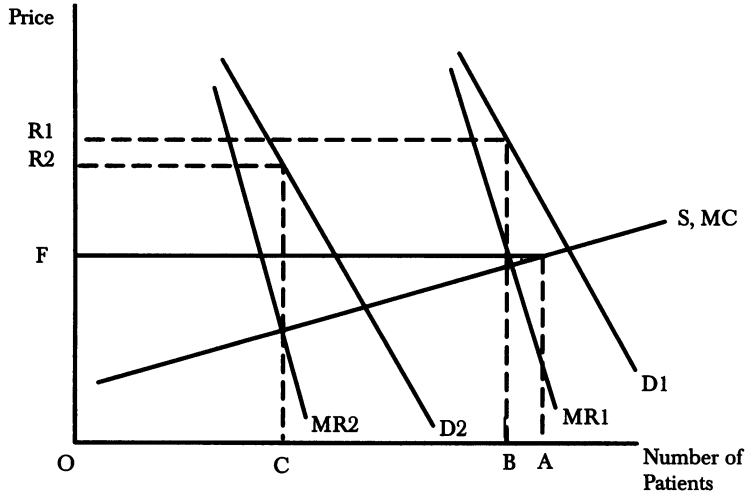
As shown in the next section, managed care penetration encourages hospitals to increase their supply of services to low-risk Medicaid patients. Hospitals that traditionally did not serve large numbers of Medicaid patients communicate to these patients and their physicians that they want their

business. This communication may take the form of targeted advertising letters to physicians or informal word of mouth among both patients and physicians. As a result, hospitals that were not given much consideration in Medicaid patients' evaluation may now look more attractive relative to traditional safety-net hospitals. In addition, Medicaid patients may believe the quality of care and level of patient amenities at non-safety-net hospitals are better. For example, some non-safety-net hospitals have labor and delivery rooms that resemble hotel suites. Safety-net hospitals tend to have older physical plants and find competing on the basis of patient amenities difficult. Medicaid patients may also wish to avoid the potential stigma of receiving care from a "charity" hospital. All things being equal, Medicaid patients may prefer non-safety-net hospitals.

Hospitals' Decision to Supply Services to Medicaid Patients

Safety-net hospitals and advocates have complained that managed care has encouraged other hospitals to compete for Medicaid patients (Friedman 1997; Siegel 1996). Figure 1 illustrates why hospitals would increase their supply of services to Medicaid patients in response to increased managed care penetration. Hospitals serve two types of patients, privately insured and Medicaid patients.[1] Hospitals face a downward-sloping demand curve, D1, for services demanded by privately insured patients and do not determine

Figure 1: Impact of Managed Care on a Hospital's Supply of Services to Medicaid Patients



the rates they receive for Medicaid patients. Hospitals choose the quantity of services they will supply to privately insured patients by setting marginal revenue for these patients equal to their marginal costs. Thus, hospitals charge the corresponding rate, R1, and serve OB privately insured patients. Hospitals serve Medicaid patients until their marginal costs equal the Medicaid reimbursement, F. As a result, hospitals serve BA Medicaid patients.

Managed care penetration affects the demand for hospital services by privately insured patients in two ways. (1) Managed care plans reduce the use of hospital services by their enrollees through fewer hospital visits, shorter lengths of stay, and less intensive services during hospital stays (Miller and Luft 1994). (2) Managed care plans negotiate lower hospital prices for the same services (Dranove, Shanley, and White 1996; Melnick et al. 1992).

These actions reduce the level of demand for hospital services by privately insured patients at every price. This is illustrated in Figure 1 by shifting the demand curve downward from D1 to D2. The downward pressure on demand results in hospitals serving fewer privately insured patients, OC, at a lower price, R2. Hospitals also increase their services to Medicaid patients from BA to CA. This effect should be greatest for those hospitals that serve a large number of privately insured managed care patients. Thus, non-safety-net hospitals should increase the amount of services they supply to Medicaid patients in comparison to safety-net hospitals. (In Appendix B, we derive this result mathematically using comparative statics.) This argument is similar to Mitchell's (1991) analysis of physician participation in Medicaid.

The predictions of this theoretical model support the claims of safety-net hospitals and advocates that non-safety-net hospitals should increase their supply of care to Medicaid patients in response to more price competition. However, should these hospitals also prefer to increase their volume of low-risk Medicaid patients relative to their volume of high-risk patients? Yes, if Medicaid pays prospectively or per diem and does not adequately adjust payment rates for services patients receive due to comorbid conditions (Ellis and McGuire 1988). Hospitals receive the same payment for similarly diagnosed patients regardless of their risk status, but low-risk Medicaid patients have lower marginal costs than high-risk patients. This induces hospitals to increase services to low-risk Medicaid patients but not to high-risk Medicaid patients. In fact, high-risk patients may be undesirable altogether if their marginal cost exceeds their Medicaid reimbursement. For example, hospitals may welcome routine Medicaid maternity cases but avoid those cases where the mother has a psychosis, depression, or drug abuse comorbidity. These comorbidities may not change patients' payment classification but will affect their use of services. We are not arguing the hospitals would not want to supply more care to

complex Medicaid patients whose payment rate is appropriately risk adjusted. However, for those patients in payment classifications where the presence of comorbidities increases patient costs but not Medicaid reimbursement, hospitals have an incentive to avoid these patients. So while hospitals will increase the level of care to Medicaid patients in general, they will continue to avoid serving high-risk Medicaid patients.

EMPIRICAL ANALYSIS

Data

The analysis uses 1991 and 1994 hospital discharge data from 25 large MSAs with at least one safety-net hospital in five states, California, Florida, Massachusetts, New Jersey, and New York. (See Appendix C for a list of these MSAs.) The study is limited to larger MSAs (populations greater than 500,000) to ensure enough high-risk patients in each type of hospital to calculate meaningful odds ratios. We included all patients in the MSA discharged from a hospital that had at least 100 discharges from the MSA.

The study uses MSAs as market areas, as opposed to geographic areas, based on patient flows (Elzinga and Hogarty 1978; Garnick, Lichtenberg, Phibbs, et al. 1989; Burns and Wholey 1992) because we are interested in how the characteristics of urban patient populations influence their use of safety-net hospitals. Market areas based on patient flows are recommended for studies seeking to understand fundamental economic relationships such as the effect of price and market structure on hospitals' ability to attract patients (Porell and Adams 1995). However, local policymakers may be more concerned with the impact of managed care on the hospital use of vulnerable patient populations residing within their jurisdiction.

Empirical Specification

The study focuses on Medicaid or self-pay/charity[2] maternity patients, or both, defined as all patient refined–diagnosis related groups (DRGs) 370, 372, 374, and 375. Maternity patients make up 34 percent of nonelderly adult hospital discharges in these MSAs. In addition, pregnant women have ample time to shop for a hospital, and hospitals have the time to identify and attract probable low-risk maternity patients.

We excluded patients transferred from another hospital, skilled nursing facility, some other health care institution, the court, or prisons because the hospital choice of the referring institutions may be systematically different

from persons who were admitted from home. We also excluded maternity discharges admitted through the emergency room because these mothers may have gone to the hospital for a severe or acute condition related or unrelated to the delivery. In this case, the mother would probably go to the nearest hospital available. This potentially excludes mothers who were not admitted due to financial or legal barriers to the health care system. For example, a mother who is an uninsured illegal immigrant may avoid using the health care system until the time of her delivery for fear of being deported. Because she does not have a regular physician, she enters the hospital through the emergency room.

The analysis files contain information on the patients' age and diagnosis from the discharge abstracts. Following Elixhauser, Steiner, and Harris (1998), we defined high-risk patients as those hospitals may want to avoid because of high expected resource use. Elixhauser, Steiner, and Harris (1998) compiled a list of 30 comorbidities associated with increased length of stay, hospital charges, and mortality (see Appendix D). Patients with at least one of these 30 comorbidities had a 34 percent longer length of stay and accrued 30 percent higher total charges. They recommend this set of comorbidities for use with administrative databases and argue it can be applied to patients from a wide range of disease groups. Their work builds upon the Charlson comorbidity index (Charlson et al. 1987) by including nonchronic illnesses that are unrelated to the reason for the hospitalizations. They used a DRG screen to eliminate secondary diagnoses related to the primary reason for the hospitalization. They also exclude conditions in the Charlson list that are not correlated with outcomes. Patients with one or more of these 30 comorbidities were identified as high-risk patients. Almost 9 percent of the maternity discharges were classified as high risk.

To approximate patients' socioeconomic status, we added the following data from the 1990 Census: the percentages of the population by race and ethnicity, the median household income for 1989, the percentage of households where English is not the primary language, and the percentage of adults with a college education. These data were linked to the patient's record using five-digit ZIP code of residence.

Statistical Analysis

Conditional choice models, based on McFadden's (1974) work on stochastic choice theory, estimate the odds of a patient choosing a hospital as a function of hospital characteristics. They allow for the estimation of the effects of patient attributes by interacting them with the hospital attributes. However,

conditional choice models have two major limitations. First, the size of the analysis file can become unmanageably large because patients may have numerous alternatives from which to choose. Second, the number of parameters can also become unmanageably large because patient attributes are interacted with the hospital characteristics. This can be particularly problematic when trying to estimate the effects of insurance status while controlling for socioeconomic status, demographic information, and patient severity. We address these problems by specifying our analysis in terms of the relative odds of choosing any safety-net hospital, rather than focusing on the choice of a specific hospital.

Logistic regression analysis was used to estimate the change in the propensity of Medicaid and self-pay/charity-care patients to use safety-net hospitals. We chose to estimate logistic regression models, as opposed to a conditional choice or gravity model, because we are primarily interested in the change in hospital choice of Medicaid and self-pay/charity patients, controlling for other patient attributes. Conditional choice and gravity models are better suited for understanding how hospital characteristics affect hospital choice. The logistic model implicitly assumes the choice set of hospitals for each MSA is comprised of those hospitals that draw a minimum number of patients (100) from the MSAs.

The dependent variable in this analysis is a dummy variable that indicates whether the discharge was from a safety-net hospital. The independent variables are patient characteristics: age, race, ethnicity, whether the patient is high risk, socioeconomic status proxies, distance to the nearest safety-net hospital, and the patient's source of payment. We also include dummy variables for each MSA within the state to control for unmeasured differences in factors such as HMO penetration, hospital competition, and the proportion of the population who are uninsured or covered by Medicaid.

The models were estimated separately for Medicaid and self-pay/charity patients. All models include a dummy variable that indicates whether this observation was from 1994, as opposed to 1991, and an interaction between year and the high-risk indicator. The odds ratio calculated from the coefficient on the year dummy variable is interpreted as the likelihood of using a safety-net hospital in 1994 relative to a similar patient in 1991. The odds ratio calculated from the coefficient on the interaction term is interpreted as the change in the likelihood from 1991 to 1994 of a high-risk patient using a safety-net hospital compared to an otherwise similar low-risk patient in 1994.

RESULTS

Separate models were estimated for each state, pooling the MSAs within a state and controlling MSA-level effects with dummy variables for each MSA.[3] Because of the number of models estimated, we report only the odds ratios for the variables of interest.[4] The coefficients of the control variables do have the expected signs: racial and ethnic minorities, persons from communities with lower incomes and educational attainment, and persons who live near a safety-net hospital were more likely to use safety-net hospitals (see Appendix E).

Changes in Safety-Net Hospitals' Shares of Medicaid and Self-Pay/Charity Patients

As background to estimating the patient-level hospital use models, we first look at changes in safety-net hospitals' shares of Medicaid and self-pay/charity maternity patients. As shown in Table 1, their shares of Medicaid maternity patients declined in each state between 1991 and 1994 with the exception of Medicaid maternity patients in New York. Safety-net hospitals' share of self-pay/charity maternity patients increased in each state. Safety-net hospitals in Florida and Massachusetts had the greatest drops in their shares of maternity Medicaid patients, losing about one-third of their market shares. However, safety-net hospitals in California and New Jersey also had substantial losses of 18 and 22 percent of their shares, respectively. These declines in market shares of Medicaid maternity patients were accompanied by increases in the shares of self-pay/charity maternity patients. Florida and New Jersey

Table 1: Safety-Net Hospitals' Shares of Medicaid and Self-Pay/Charity Maternity Discharges in Selected MSAs, by Year and State for Large MSAs

		Medicaid Discharges		*Self-Pay/Charity*	
State	*Number of MSAs*	*1991*	*1994*	*1991*	*1994*
California	10	50.1	41.2	32.6	36.1
Florida	6	62.8	41.8	50.6	75.6
Massachusetts	3	25.4	17.1	29.6	32.4
New Jersey	3	50.5	39.1	46.2	62.8
New York	3	42.6	56.8	28.6	30.0

Source: Georgetown University Medical Center analysis of State Hospital Discharge data for CA, FL, MA, NJ, and NY. Analysis performed by authors based on SHD data.

safety-net hospitals had the greatest increases in shares of self-pay/charity maternity patients, with 49 and 36 percent, respectively.

Individual Choice Models

The relative odds reported in Table 2 indicate that Medicaid patients' propensity to use safety-net hospitals was lower in 1994 than in 1991. With the exception of the New York MSAs, Medicaid maternity patients were 35 to 72 percent less likely to use a safety-net hospital in 1994 compared to 1991. In New York, Medicaid maternity patients were 89 percent more likely to use a safety-net hospital in 1994.

While the propensity for Medicaid patients to use safety-net hospitals generally declined, the propensity for self-pay/charity patients to use safety-net hospitals increased. Self-pay/charity maternity patients' use of safety-net hospitals increased by 74 percent in Florida, 36 percent in New Jersey, and 113 percent in New York, while in California their use remained constant. In Massachusetts, maternity self-pay/charity patients' use of safety-net hospitals also increased, but the change was not statistically significant.

Individual Choice Models, by Severity of Illness

The change in Medicaid patients' use of safety-net hospitals did differ with patient severity, although not consistently across states (Table 3). From 1991 to 1994, the odds that a Medicaid high-risk maternity patient—a patient with one

Table 2: Odds Ratios and 95% Confidence Intervals of a Medicaid or Self-Pay/Charity Patient in 1994 Using a Safety-Net Hospital Relative to a Similar Maternity Patient in 1991, Selected MSAs in Five States

State	*Number of MSAs*	*Medicaid Discharges*	*Self-Pay Discharges*
California	10	0.644**	1.008
		(0.634–0.654)	(0.942–1.078)
Florida	6	0.282**	1.739**
		(0.271–0.293)	(1.612–1.876)
Massachusetts	3	0.526**	1.207
		(0.486–0.569)	(0.958–1.519)
New Jersey	3	0.656**	1.359**
		(0.622–0.693)	(1.194–1.547)
New York	3	1.890**	2.128**
		(1.848–1.933)	(1.923–2.356)

Note: 95% confidence intervals in parentheses.

** Significant at the one percent level; *significant at the 5 percent level.

Table 3: The Change from 1991 to 1994 in the Odds of High-Risk Medicaid Maternity Patients Using a Safety-Net Hospital Relative to a Low-Risk Medicaid Maternity Patient, Selected MSAs in Five States

State	*Number of MSAs*	*Odds Ratio*
California	10	0.850** (0.796–0.918)
Florida	6	1.420** (1.223–1.649)
Massachusetts	3	1.207 (0.934–1.561)
New Jersey	3	1.200* (1.025–1.404)
New York	3	0.730** (0.675–0.789)

Note: 95% confidence intervals in parentheses.

** Significant at the one percent level; *significant at the 5 percent level.

or more comorbidities—used a safety-net hospital relative to a Medicaid low-risk maternity patient increased in Florida by 42 percent and in New Jersey and Massachusetts by 20 percent (although the increase in Massachusetts was not statistically significant). However, in California and New York, the odds that a Medicaid high-risk maternity patient used a safety-net hospital compared to a Medicaid low-risk maternity patient fell by 14.5 and 27 percent, respectively. In Massachusetts, the odds did not change over time.

CONCLUSIONS AND POLICY IMPLICATIONS

Our findings suggest that between 1991 and 1994, safety-net hospitals treated fewer Medicaid maternity patients in the five states we analyzed. Pregnant women's Medicaid eligibility and risk status can be predetermined because their need for prenatal care causes them to enter the health care system months before their hospitalization. This allows hospitals to identify low-risk Medicaid maternity patients more easily in order to attract them.

Such marketing may not occur with patients directly, but it may occur instead through their physicians. Non-safety-net hospitals may actively encourage physicians to admit low-risk Medicaid patients while discouraging them from admitting uninsured or high-risk Medicaid patients. Physicians may in fact view it as a benefit for their routine Medicaid maternity patients

that they cannot offer their self-pay/charity or high-risk patients. Therefore, they continue to admit these patients to the safety-net hospitals that have traditionally served them.

This argument presumes that physicians who serve Medicaid patients have admitting privileges at several hospitals. Under this scenario, physicians offer their maternity patients a menu of hospitals. However, hospitals can affect the menu by encouraging or discouraging physicians to admit certain types of patients.

The results varied somewhat across states, with New York standing out as the only state where Medicaid maternity patients were more likely to use safety-net hospitals. However, this may be due in part to differences in the regulatory environments, as well as the levels of HMO penetration or characteristics of the hospital markets. New York during this time period was a partial-payer rate-setting state. Hospitals could not compete aggressively on price. Therefore, non-safety-net hospitals would not feel pressure to attract Medicaid patients in order to maintain patient volume. Hence, safety-net hospitals in New York actually increased their market share of Medicaid patients during this time period. However, in the other states where hospitals were able to compete on price, safety-net hospitals lost their Medicaid market shares.

The hospital sectors in New Jersey and Massachusetts are dominated by not-for-profit hospitals. Also, both of these states were regulating hospital rates at the beginning of our study period. New Jersey ended their rate-setting system in 1992, while Massachusetts abandoned theirs in 1991. Florida and California are states with less regulation and significant for-profit ownership in their hospital sectors. All of these states did provide hospitals some financial relief with respect to uncompensated care costs. New Jersey had a charity care pool, while Massachusetts, Florida, and California used Medicaid disproportionate share (DSH) adjustment funds.[5]

The decline in Medicaid maternity discharges in safety-net hospitals in some states may be due to Medicaid managed care. During the study period, California, Florida, and Massachusetts implemented mandatory Medicaid managed care programs that affected primarily the Aid for Families with Dependent Children and poverty-related beneficiaries (Holahan et al. 1997a; Lipson, Norton, and Dubay 1997; Zuckerman, Coughlin, Nichols, et al. 1998). New Jersey actively promoted its Medicaid managed care program, although it was voluntary until 1995 (Bovbjerg et al. 1998). Medicaid managed care in New York was primarily concentrated in the northern counties during the study period. New York did not begin expanding its program until 1997

(Holahan et al. 1997b). New York is the only study state where the odds of a Medicaid maternity patient using a safety-net hospital did not decline.

While Medicaid enrollment increased in each of the states during the study period, the results are probably not due to Medicaid expansions. Medicaid enrollment for families grew at a substantially lower rate during the period 1992–95 (4.9 percent) than the years prior, 1988 to 1992 (9 percent) (Holahan 1998). During the period 1990–92, in each of the five study states, the adult non-cash-assistance enrollment grew at a much faster rate than the adult cash–assistance enrollment (Table 4). During the period 1992–95, the average annual rate of growth in the adult non-cash-assistance enrollment slowed considerably, although it remained above the rate of growth in the adult cash-assistance enrollment in two of our states. The growth in non-cash-assistance enrollment between 1991 and 1992 would have resulted in non-safety-net hospitals receiving a greater share of Medicaid patients if these patients had a higher use of non-safety-net hospitals prior to their enrollment in Medicaid. This is unlikely because it suggests that these previously uninsured low income adults were less dependent on safety-net hospitals for their care than their Medicaid counterparts. In addition, we try to control for these changes over time in the composition of the Medicaid inpatient population by including patients' socioeconomic status, proximity to the nearest safety-net hospital, and other patient attributes in our models.

Table 4: Average Annual Growth in Medicaid Enrollment in Selected States, 1990–95

	Adult Cash Assistance		*Adult Noncash Assistance*		*Total*‡	
	1990–92	*1992–95*	*1990–92*	*1992–95*	*1990–92*	*1992–95*
California	5.3	6.3	25.7	2.3	12.5	3.8
Florida	22.2	5.4	4.2	4.3	23.3	6.2
Massachusetts†	6.1	−0.1	NA	NA	5.3	1.8
New Jersey	5.9	−1.3	57.5	3.1	10.9	3.6
New York	5.2	4.7	11.9	5.9	5.8	4.4
United States	7.2	0.6	20.5	11.0	11.3	5.2

Source: Based on HCFA 2082 data published in several State Reports on Health Policy for Low-Income People as a part of The Urban Institute's Assessing the New Federalism project (Bovbjerg et al. 1998; Holahan et al. 1997a, 1997b; Lipson, Norton, and Dubay 1997; Zuckerman, Coughlin, Nichols, et al. 1998).

† Average annual growth in Medicaid enrollment for Massachusetts was only reported for adult cash and noncash combined.

‡ The total includes the other eligibility categories: blind/disabled, children, and the elderly.

Our main assumption is that increased HMO penetration leads to increased price competition in the market for privately insured patients. The resulting reduction in patient volume and revenues from the private market made Medicaid patients more attractive to non-safety-net hospitals. This implies a redistribution of Medicaid patients from safety-net hospitals to non-safety-net hospitals. Although we do not control for HMO penetration or the level of price competition directly in our analysis, we do observe a redistribution of Medicaid patients from safety-net hospitals. This evidence, along with the fact that 22 of the 25 MSAs in the study experienced an increase in HMO penetration during 1991–94, with nine MSAs having an increase of more than 10 percentage points, supports our explanation (see Appendix C).

Another possible explanation is that Medicaid enrollment may have increased in geographic market areas of non-safety-net hospitals, which resulted in an increase in their share of Medicaid patients. We tried to control for this phenomenon by including in our model the distance between the patient and the nearest safety-net hospital. We also recognize that some of the reduction in the care of self-pay/charity patients by non-safety-net hospitals may not have been absorbed by safety-net hospitals and thus would not be captured in hospital discharge data. To some extent we may have understated the impact of reductions in hospital self-pay/charity care on access to care for the uninsured.

The primary policy concern this article raises is the continued survival of safety-net hospitals. Obviously, if these trends continue, safety-net hospitals will lose Medicaid patient revenues and public subsidies based on Medicaid patient volumes, such as DSH payments. The revenues help subsidize care for uninsured and underinsured patients. If safety-net hospitals continue to lose their low-risk Medicaid patients, their ability to finance care for the medically indigent will be impaired. Medicaid managed care and increased hospital competition may improve access to hospital care for low-risk Medicaid patients, but policymakers should be cognizant of the potential reduction in access to hospital care for uninsured and underinsured patients. If these patients are able to find adequate care in other hospitals, potential access to care problems will be eased. However, safety-net hospitals still provide the lion's share of care to the medically indigent. Public policymakers should ensure that safety-net hospitals have sufficient financial resources to care for medically indigent patients through direct subsidies.

Market forces may ultimately change the role of safety-net hospitals in the care of Medicaid patients. This may result in an overall improvement in hospital care for Medicaid patients. Medicaid patients may prefer the "perceived" higher quality and broader set of amenities that other hospitals

are able to offer them. If safety-net hospitals remain in their choice set, Medicaid patients' selection of other hospitals reveals their preferences.

However, what's good for Medicaid patients in the short term may not be good for society in the long term. If market forces are allowed to erode the hospital safety net, society's ability to provide care for the poor and uninsured in the future is unclear. The number of uninsured Americans continues to rise, from 34.7 million in 1990 to 43.4 million in 1997, indicating the need for charity care will not abate (U. S. Bureau of the Census 1998). Also, if hospitals regain leverage in the market for privately insured care, they may reduce their supply of services to Medicaid patients. If the hospital safety-net is eroded or severely weakened, where will these "jilted" Medicaid patients find care?

As hospital markets continue down this path of increased price competition, policymakers should consider how the hospital safety net should evolve. An eroded safety net is not the only destination. However, careful planning and proactive policymaking will be required to ensure safety-net hospitals thrive in the changing market place. Seigel (1996) and Gaskin (1998) outline some strategies for public hospital officials and public policymakers that will improve publicly owned safety-net hospitals' positions in the market place. Griner and Blumenthal (1998) and The Commonwealth Fund Task Force on Academic Health Centers (1997) outline management strategies and public policies that will improve the competitive positions of major teaching hospitals, another important part of the hospital safety net. To secure the viability of the hospital safety net, public policies and management strategies must adapt to the changing market place.

APPENDIX A

Characteristics of Safety-Net Hospitals in the Selected MSAs in Five States, 1994

State	*Number of MSAs*	*Total Number of Hospitals in Selected MSAs*	*Percent of Hospitals in MSA that Are Safety Net*	*Percent of Safety Nets that Are Publicly Owned*	*Percent of Safety Nets that Are Major Teaching*	*Average Bedsize of Safety-Net Hospital*
California	10	228	18.4	38.1	21.4	253
Florida	6	119	16.0	36.8	10.5	363
Massachusetts	3	55	10.9	33.3	50.0	296
New Jersey	3	47	21.3	20.0	10.0	452
New York	3	113	27.4	45.2	54.8	522

Source: Georgetown University Medical Center Analysis of American Hospital Association's 1994 Annual Survey of Hospitals Data. This analysis was performed by the authors using 1994 AHA data.

APPENDIX B

A Model of Hospitals' Supply of Services to Publicly Financed Patients

Suppose hospitals serve two types of patients, privately insured patients and publicly financed patients. Hospitals face a downward sloping demand curve for privately insured patients, denoted by $P(r)$, where r is the rate charged by the hospital. The demand for hospital services by privately insured patients is affected by exogenous factors such as managed care penetration, denoted by h. An increase in the level of managed care penetration reduces the demand for hospital services, holding price constant; that is, P_h is negative. Managed care penetration may depress demand for hospital services by privately insured patients by decreasing the hospital use of their enrollees and negotiating lower rates for hospital care.

In the market for public patients, denoted by M, hospitals are price takers. The federal and state governments set the fees, denoted by f, for the patients they sponsor. Each hospital has a cost function $C(P, M)$, which determines its supply curve. We assume their cost functions are "well behaved." Marginal cost is positive and increasing for both types of patients, and the joint costs associated with serving both types of patients is also positive; that is, $C_P > 0$, $C_M > 0$, $C_{PP} > 0$, $C_{MM} > 0$, and $C_{MP} > 0$.

The profit-maximizing hospital solves the following optimization problem:

$$\max_{r,\,M} \pi = \pi(r, M; h). \tag{1}$$

The hospital's profits can be written as:

$$\pi = rP(r; h) + fM - C(P(r; h), M). \tag{2}$$

The first order conditions are:

$$\pi_r = P + rP_r - C_P P_r = 0 \tag{3}$$

$$\pi_M = f - C_M = 0 \tag{4}$$

To determine the amount of private patients, hospitals set their marginal revenues equal to their marginal costs and choose the corresponding rate and number of patients from the demand curve.[6] To determine the amount of public patients, hospitals set their marginal costs equal to the government-set fee. The second order conditions are:

$$\pi_r < 0, \pi_{MM} < 0, \pi_{rr}\pi_{MM} - (\pi_{rM})^2 \tag{5}$$

Hospitals solve the first order conditions for the optimal values for r^* and M^*. Using comparative statics, we can show that hospital supply of services to public patients (M^*) will increase when the level of managed care penetration (h) increases under some reasonable assumptions. Using the first order conditions and Cramer's rule, we can solve for the derivative of M^* with respect to h.

$$\frac{\partial M^*}{\partial h} = \frac{-\pi_{Mh}\pi_{rr} + \pi_{rh}\pi_{rM}}{\pi_{rr}\pi_{MM} - (\pi_{rM})^2}. \tag{6}$$

From the second-order conditions, we know that the denominator is positive. The sign of the numerator is also positive under reasonable assumptions.

$$-\pi_{Mh}\pi_{rr} + \pi_{rh}\pi_{rM} = C_{MP}P_hP_r + C_{MP}(r - C_P)(P_hP_{rr} - P_rP_{rh}) > 0. \tag{7}$$

This is true if $P_{rr} < 0$ and $P_{rh} > 0$; that is, consumers become less price sensitive as price increases and more price sensitive as managed care penetration increases.

Implicit in the model, we assume managed care affects hospitals only through privately insured patients' demand for care. Managed care penetration could also affect hospital costs directly by changing hospitals' production function. Hospitals may change their delivery systems in response to managed care. Adding this wrinkle to the cost function does not change the overall result. Intuitively, any increased efficiency in production will likely affect privately insured and publicly sponsored patients similarly. The relative difference in the marginal costs associated with each type of patient probably does not change dramatically with such efficiency gains. Thus, the efficiency gains do not encourage hospitals to favor one type of patient over another.

Suppose hospitals maximize utility instead of profits. Now utility is a function of profits and hospitals' social missions. Social missions could be charity care, graduate medical education, public health and specialty services, or community benefits such as health fairs, speakers' bureaus, meals on wheels, health education, and immunizations. The introduction of social missions changes hospitals' objective and cost functions. The objective function is $U(x, \pi)$ where $U_x > 0$ and $U_\pi > 0$. The cost function is $C(M, P, X)$, where marginal cost is positive and increasing. While the introduction of social missions complicates the math, it should not change the direction of the effect of managed care on the hospital supply of services to publicly sponsored patients.

APPENDIX C

List of the MSAs in the Study

	State	MSA Name	Population 1994	HMO Penetration 1991	HMO Penetration 1994	
1	CA	Bakersfield	609,326	na	13.70	na
2	CA	Fresno	834,654	6.40	22.50	+
3	CA	Los Angeles–Long Beach	9,149,840	36.18	41.00	+
4	CA	Oakland†	2,182,419	41.80	47.31	+
5	CA	Orange County†	2,543,124	34.50	42.40	+
6	CA	Riverside–San Bernardino	2,906,522	36.18	48.40	+
7	CA	Sacramento†	1,441,463	41.80	46.90	+
8	CA	San Francisco†	1,645,954	34.40	33.90	–
9	CA	San Jose†	1,557,211	37.30	43.30	+
10	CA	Ventura	702,728	36.18	41.00	+
11	FL	Fort Lauderdale	1,382,983	17.54	30.10	+
12	FL	Jacksonville	971,824	14.06	33.90	+
13	FL	Miami	2,025,040	17.54	33.20	+
14	FL	Orlando	1,361,476	14.16	26.20	+
15	FL	Tampa–St. Pete–Clearwater	2,156,524	13.98	25.80	+
16	FL	West Palm Beach–Boca Raton	954,539	17.54	25.70	+
17	MA	Boston	4,049,507	31.51	42.10	+
18	MA	Springfield	666,399	10.03	8.70	–
19	MA	Worcester	717,060	50.75	48.20	–
20	NJ	Bergen	1,304,148	13.07	14.80	+
21	NJ	Jersey City	552,384	13.07	11.50	–
22	NJ	Newark	1,933,711	13.07	22.20	+
23	NY	Buffalo	1,189,065	27.11	32.50	+
24	NY	Nassau-Suffolk	2,651,470	13.07	20.40	+
25	NY	New York City	8,583,846	13.07	22.30	+

Source: Bureau of Health Professions' Area Resource File (1997); InterStudy Competitive Edge (1992, 1995); and MEDSTAT Group/Inforum (1994).

Note: na = not available in 1991. The plus signs (+) denote increase; the minus signs (–) denote decrease.

† These 1992 data are from MEDSTAT Group/Inforum (1994).

APPENDIX D

List of Comorbidity Measures

No.	*Condition*	*No.*	*Condition*
1	Congestive heart failure	17	Lymphoma
2	Cardiac arrhythmias	18	Metastatic cancer
3	Valvular disease	19	Solid tumor without metastasis
4	Pulmonary circulation disorders	20	Rheumatoid arthritis/collagen vascular diseases
5	Peripheral vascular disorders		
6	Hypertension (combine uncomplicated and complicated)	21	Coagulopathy
		22	Obesity
7	Paralysis	23	Weight loss
8	Other neurological disorders	24	Fluid and electrolyte disorders
9	Chronic pulmonary disease	25	Blood loss anemia
10	Diabetes, uncomplicated	26	Deficiency anemias
11	Diabetes, complicated	27	Alcohol abuse
12	Hypothyroidism	28	Drug abuse
13	Renal failure	29	Psychoses
14	Liver disease	30	Depression
15	Peptic ulcer disease excluding bleeding		
16	AIDS: acquired immune deficiency syndrome		

Source: Elixhauser, Steiner, and Harris (1998).

APPENDIX E

Models of Use of Safety-Net Hospitals by Medicaid and Self-Pay/Charity Maternity Patients for Selected California MSAs, 1991–94

	Medicaid Discharges (N = 323,792)		*Self-Pay/Charity Discharges (N = 27,388)*	
Independent Variables	*Parameter Estimate*	*Standard Error*	*Parameter Estimate*	*Standard Error*
Intercept	−1.58**	0.030	−3.07**	0.124
Age 12–24	−0.11**	0.0082	0.26**	0.033
Age 34+	0.038*	0.016	−0.14**	0.048
Percent African American	1.83**	0.031	2.45**	0.138
Percent Hispanic	0.75**	0.079	5.36**	0.272
Percent other	−1.06**	0.094	6.64**	0.309
Median household income	−7.61E-7	5.868E-7	−2.01E-6	1.89E-6
Percent non-English	3.10**	0.092	−1.42**	0.330
Distance to nearest urban safety-net hospital	−0.0058**	0.00033	0.0195**	0.00129
Year = 1994	−0.44**	0.0081	0.0075	0.0344
One or more comorbidities	0.088**	0.029	−0.24*	0.124
Year = 1994* comorbidities	−0.16**	0.036	−0.22	0.180
Fresno MSA	−2.15**	0.10	−1.29*	0.779
Oakland MSA	−0.26**	0.024	−2.75**	0.721
Orange MSA	−0.43**	0.015	−1.21**	0.059
Riverside MSA	0.52**	0.013	0.99**	0.048
Sacramento MSA	−1.07**	0.027	−4.72**	1.002
San Francisco MSA	−0.65**	0.022	−1.30**	0.106
San Jose MSA	0.92**	0.020	−3.17**	0.418
Ventura MSA	0.86**	0.029	−3.28**	0.415
Bakersfield MSA	0.21**	0.032	−3.21**	0.455

Note: Los Angeles is the reference MSA. Patient ages 25–34 is the reference group.

** Significant at the one percent level; *significant at the 5 percent level.

NOTES

1. We ignore Medicare patients. Excluding them simplifies the model but does not change the result. Because hospitals are also price takers in the Medicare market, managed care penetration also increases hospitals' supply of services to Medicare patients.
2. The 1991 Florida discharge data do not identify self-pay/charity patients separately from patients covered by workers' compensation, Veterans Administration, CHAMPUS, or local and state government programs. Thus, in Florida the self-pay patients include these other patient groups. An analysis of the 1994 Florida data suggests that self-pay/charity patients made up the large majority of these cases in 1994.

3. We also estimated the models for each of the 25 MSAs in the five states to ensure that the results are consistent at the MSA level.
4. To give the reader a better idea of how these models performed, we present the models estimated for California in Appendix E.
5. DSH adjustment is a payment adjustment under Medicaid and Medicare for hospitals that serve large volumes of low-income patients.
6. Our model assumes hospitals are operating at capacity, which may be realistic if we define capacity based on staffing levels instead of occupancy rates. However, we can account for excess capacity in the model if we consider how it affects demand by private pay patients in the preprice competition period. Excess capacity increased demand by private pay patients. Excess capacity allowed hospitals to attract physicians who were the source of hospitals' admissions. Hospitals with enough excess capacity rarely turned physicians away when they wanted to admit their patients. Hospitals did not fill these excess beds with Medicaid patients because large Medicaid caseloads would have made the hospitals unattractive to private pay patients. These patients' hospital choices were more sensitive to hospital amenities than prices. Hospitals did not have a strong financial incentive to seek Medicaid patients because private insurers paid charges, thus maintaining healthy hospital margins. As markets become price competitive and excess capacity becomes a liability, hospitals replace lost revenues for private payers with Medicaid revenues.

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