



A STATISTICAL ANALYSIS OF THE IMPACT OF  
NONPROFIT HOSPITAL CONVERSIONS ON  
HOSPITALS AND COMMUNITIES, 1985–1996

Jack Hadley, Bradford H. Gray, and Sara R. Collins

May 2001

Support for this research was provided by The Commonwealth Fund. The views presented here are those of the authors and should not be attributed to The Commonwealth Fund or its directors, officers, or staff.

Copies of this report are available from The Commonwealth Fund's website at [www.cmwf.org](http://www.cmwf.org) (publication number 456).

## CONTENTS

Introduction.....	1
Prior Research .....	2
Research Methodology .....	3
Results.....	7
Conclusions .....	11
References.....	14
Tables .....	15

# A STATISTICAL ANALYSIS OF THE IMPACT OF NONPROFIT HOSPITAL CONVERSIONS ON HOSPITALS AND COMMUNITIES, 1985–1996

## Introduction

The mid-1990s saw a sharp increase in the number of private nonprofit hospitals converting to for-profit ownership. Conversion to for-profit ownership is not a new phenomenon—there was a relatively large number of conversions between 1983 and 1985 following implementation of Medicare’s Prospective Payment System (PPS) for hospitals. Nevertheless, the recent conversions raised anew public concerns about their effects on access to care by low-income people and the availability of community benefits, such as highly specialized emergency services, medical education, and clinical research.

These concerns generally take two forms. One is that converting hospitals will reduce their own levels of community benefit activities, since these are generally thought to be unprofitable and therefore incompatible with for-profit hospitals’ presumptive goal of profit maximization. The other is that conversion to for-profit status harms the ability of neighboring hospitals to provide charity care and other community benefits. By not doing “their share” and/or increasing the competition for fully insured patients, converting hospitals increase neighboring hospitals’ community burdens and/or reduce their fiscal capacity to meet their community obligations. In either case, the community comes up short—low-income people receive less care, all patients have reduced access to specialized emergency services, and society-at-large foregoes the benefits of medical education and research.

In this study, we present the results of a statistical analysis of the effects of hospital conversion from private nonprofit to for-profit status on several measures of community benefit, both at the individual hospital level and the community level. We analyze the effects of private, nonprofit hospital conversions that occurred between 1985 and 1993 by comparing converting hospitals to a control group of statistically similar private nonprofit hospitals that were estimated to have a high probability of conversion, but did not convert over the observation period. We also examine changes in hospitals that were “neighbors” of the individual converting and comparison hospitals.

Our analysis looks at levels of community benefit in 1996 and changes between 1993 and 1996 as a function of hospitals’ conversion status, the length of time since they converted, and changes in local market conditions. In addition, like several earlier studies, we also conduct a series of before-and-after comparisons of the converting and control hospitals.

## Prior Research

The sharp increase in the number of hospitals converting from nonprofit to for-profit ownership in the early 1990s sparked several recent studies of the effects of ownership conversion. The most extensive analysis examined 80 conversions (from both public and private nonprofit ownership) in California, Florida, and Texas between 1993 and 1995 (Young and Desai, 1999). Although covering only three years, this represents one-third of the conversion since 1980. Their comparison group consisted of 129 “matched” hospitals randomly drawn from a pool of acute care, nonteaching hospitals in the same state, stratified into four cells based on median hospital size and median county per capita income. Their community benefit measures consisted of uncompensated care, the price of care, an index of unprofitable services, and community representation on hospital boards. They compared these measures three years before conversion to three and six years after conversion for both converting and control hospitals. They found essentially no differences in their measures, consistent with an earlier study performed by the same authors on 17 California conversions between 1980 and 1992 (Young, Desai, and Lukas, 1997).

Needelman, Lamphere, and Chollet (1999) analyzed 15 private, nonprofit conversions (out of an original universe of 31 conversions) in Florida over the time period 1981 through 1996. Their control group consisted of all hospitals that were private, nonprofits over the entire time period. Data for the converting and control hospitals over all years were combined to form a time-series/cross-section database for an analysis of hospitals' percentage of uncompensated care as the dependent variable, with the key independent variables constructed as dichotomous indicators of conversion status. Other control variables included hospital size, teaching status, metro location, and year. Based on their analysis, they concluded that nonprofit converters had low rates of uncompensated care both before and after conversion, and that those rates were lower than those of the control group, which included all private, nonprofit hospitals, regardless of size or teaching status.

Mark (1999) focused primarily on the determinants of hospital conversion, from both nonprofit to for-profit and vice versa, and the financial consequences and correlates of conversion, in terms of Medicare cost per case, average revenue per case, and staffing per 1,000 adjusted patient days. Her comprehensive analysis used data for virtually all hospitals in the U.S. between 1989 and 1992. Poor financial status, low per capita income, and high hospital competition were all found to be significant determinants of conversion. The analysis further found that financial status generally improved for hospitals that changed ownership type. She also found that 11 percent of the private, nonprofit converters closed by 1995.

Overall, these recent statistical studies suggest that conversion from private, nonprofit to for-profit ownership has little effect on community benefits, as measured by uncompensated care and the provision of special services. However, none of these studies analyzed possible spillover impacts on neighboring hospitals, and they were limited in their methods for constructing control groups and conducting statistical analyses.

### Research Methodology

Like earlier studies of the impact of hospital conversion, we analyze pre- and post-conversion data for the hospitals that change ownership and for a set of control hospitals. In addition, we analyze changes in converting and control hospitals for a fixed, recent time period, 1993 to 1996, in order to assess possible longer-term consequences of hospital conversion. Finally, we also examine changes that occurred between 1993 and 1996 at hospitals that were neighbors—especially those that are public hospitals or major teaching hospitals (members of COTH, The Council of Teaching Hospitals) —of the samples of converting and control hospitals. Again, the purpose is to determine whether there may have been longer-term consequences on nearby hospitals.

The control sample is a set of private, nonprofit hospitals that were *predicted* to have a very high probability of converting to for-profit ownership at some point over the relevant time period, *but did not, in fact, change ownership*. We used a logistic regression model estimated with data from a pooled, time-series/cross-section database of all private, nonprofit, short-term general hospitals over the time period 1985–1994 to predict the probability of converting to for-profit ownership. In the next section, we describe the hospital database used to estimate the logistic model. We then describe the variables used in the logistic analysis, and in the third section, explain how the control hospitals were selected.

#### *Hospital Database*

The primary database used in this analysis was constructed from the American Hospital Association's Annual Survey of Hospitals for the years 1983 through 1996. For the purpose of estimating the predictive model of hospital conversion, we first limited the database to the years 1985–1994, reserving the earlier and later years to obtain pre- and post-conversion information. We then identified all short-term, general hospitals that reported ownership as private, nonprofit in one year and for-profit in the next year, and had been in continuous operation for at least the preceding three years. We also excluded hospitals in states where there had been fewer than three conversions of nonprofit (either public or private) hospitals to for-profit status over the entire time period, since the likelihood of conversion for any hospitals in those states was very low (Mullner and

Hadley, 1984). This constraint eliminated hospitals in 36 states from further consideration by the analysis. Finally, once a hospital changed ownership from private, nonprofit to for-profit, it was deleted from the database for the years following the year of conversion. Thus, in any particular year, the database included only hospitals that converted ownership in that particular year and hospitals that were under private, nonprofit ownership in every year since 1983. This process yielded 137 hospitals that apparently changed ownership from private, nonprofit status to for-profit between 1985 and 1994.

It became clear in considering a subset of these hospitals for in-depth case studies that there were inaccuracies in the Annual Surveys with regard to both a hospital's change of ownership status and the date when conversions actually took place. The verification process involved checking the directories of the Federation of American Health Systems, which has for-profit hospitals as members, searching newspaper sources using Nexis and Proquest, examining year-to-year ownership post-conversion to determine whether the apparent conversion reappeared as a nonprofit hospital in the subsequent year or two after conversion, and, in cases that remained ambiguous, by making telephone calls to current or former hospital administrators. We determined that 29 hospitals either did not convert to for-profit status or converted from public ownership to for-profit ownership, and that three hospitals changed ownership before 1985. For another 44 hospitals, the year of conversion was inaccurate—in most cases the actual conversion year was one or two years before the first year the hospital was listed as a for-profit. The final database for estimating the logistic model for predicting hospital ownership change consisted of 105 hospitals that changed ownership between 1985 and 1994 from private nonprofit to for-profit, and 15,058 observations (hospital-years) of private, nonprofit hospitals that did not convert to for-profit ownership. County-level variables describing basic demographic characteristics were merged to all hospitals from the Area Resource File.

#### *Multivariate Analysis of Hospital Conversion*

The set of independent variables used to predict hospital ownership conversion includes market and hospital characteristics suggested by earlier studies. Market-level variables are lagged by one year, while hospital characteristics are lagged two years. This reflects the perception that the process of changing ownership takes place over a one-to-two-year time period, and that the hospital data reported for the year of conversion itself may be highly unreliable.

Table 1 lists the independent variables and reports their mean values, logistic regression coefficients, and p-values. The percentages of total hospital beds that are in for-profit hospitals, both at the state level and in each hospital's county, reflects the area's

receptiveness to for-profit hospital ownership. County level per capita income, percentage of the population enrolled in HMOs, percentage of the population covered by Medicare, population growth, and population density account for variations in the demand for hospital services. An indirect measure of the percentage of the population covered by Medicaid is the county-wide share of hospital discharges covered by Medicaid. Hospital competition is measured by a Herfindahl index computed from data on the distribution of hospital beds across hospitals in the county. We also created dummy variables to indicate whether there is a public hospital or a major teaching (COTH) hospital in the county.

The variables measuring hospital characteristics were chosen to capture the potential attractiveness of for-profit conversion based on the hospital's size, the range of services it offered, and the types of patients it treated. Hospital services were measured by dummy variables indicating whether the hospital provided burn care, emergency department care, pediatric intensive care, neonatal intensive care, medical-surgical intensive care, open-heart surgery, transplant services, and obstetric services (by level of care). Patient characteristics were measured by the percentages of discharges that were Medicaid or long-term care cases, and by the ratio of emergency room visits to inpatient admissions. The extent of teaching and research activities was measured by the full-time-equivalent (FTE) number of interns and residents. The hospital's management structure was measured by dummy variables indicating whether the hospital was part of a chain, was operated by contract management, or was owned by a religious institution. Lastly, the predictive model includes separate dummy variables for each year to capture secular variations in the likelihood of converting to for-profit ownership.

The probability of conversion is positively and significantly ( $p < 0.10$ ) related to the proportion of beds in the state already in for-profit hospitals, the level of HMO enrollment in the county, the percentage change in population over the prior five years in the county, whether the hospital was part of a chain or was under contract management ( $p = 0.11$ ), and whether it had open-heart surgery capability. Factors associated with a significantly lower probability of conversion are per capita income in the county, having an emergency department, the number of hospital beds, having a transplant capability, and being a Level 2 or Level 3 provider of obstetrics services. The year dummies indicate that the probability of conversion declined from the mid-1980s through 1990, and then began to increase starting in 1991, approaching the 1984 level by 1993–94.

#### *Selection of Control Hospitals*

Using the logistic regression model described above, we predicted the probability of a hospital's converting from private, nonprofit to for-profit status for each year between

1985 and 1994. We then sorted hospitals by the predicted probability of conversion over all years, as well as within each year, and selected two sets of control hospitals. The first set was the 150 hospitals with the highest predicted probability of conversion regardless of year; the second set was hospitals with the highest predicted probability of conversion in each year, where the number selected each year was based on the number of actual converting hospitals in that year. We chose the second criterion so that hospitals in the control group would have a similar distribution over time as the set of actual converting hospitals. Elimination of duplicate hospitals, since a hospital could have been among the highest-probability converters in several years, resulted in a control sample of 278 hospitals.

In addition to direct comparisons between actual converters and the control sample, we also examine the potential impacts of hospital conversion on neighboring hospitals. Using information on hospitals' latitudes and longitudes based on the population centroids of their five-digit zip codes, we identified all short-term, general, nonfederal hospitals within a fixed radius of up to 10 miles of either a converting hospital or a control hospital. Since any particular hospital could be a neighbor of either a converting and/or a control hospital, we eliminated duplicate selections by assigning neighbors to groups based first on their proximity to a converting hospital and then on their proximity to a control hospital. This process resulted in identifying 453 neighbors of converting hospitals, and 442 neighbors of control hospitals.

#### *Measures of the Effects of Hospital Conversion*

We divide our analysis of the effects of hospital conversion into four categories. First, we compare the histories of the converting and control hospitals. What were their characteristics at "baseline," and what was their status in 1996, the end of the observation period? How many were still open and functioning as short-term, general hospitals?

Second, we analyze before-and-after changes in several measures of hospital performance. The "before" comparison looks at the change from three years prior to the conversion year to the year of conversion. Selecting a three-year "look back" should lessen the effects of changes in performance associated with the conversion process, which often takes at least two years. The "after" comparisons compare changes three and five years following conversion, allowing both a short-term and a longer-term assessment of the effects of conversion.

Third, were there any effects on community benefits or uncompensated care? We address this question by looking at changes between 1993 and 1996. We chose this fixed

time period for two reasons. First, it is relatively recent and provides an opportunity to evaluate the current status of converting and control hospitals, regardless of when the conversion occurred. Second, this approach allows us to determine whether the length of time since conversion has an independent effect on hospitals' characteristics and performance during a recent time period.

We use as measures of community benefit the provision of care to AIDS patients, the operation of an emergency department and the volumes of both emergency visits and total outpatient visits, the maintenance of inpatient alcohol and drug treatment care, care of Medicaid patients, and the volume of births. In addition, we also examine whether there were differences in 1996 in hospitals' responses to a variety of questions from the Annual Survey asking explicitly about hospitals' community orientations.

Fourth, were there any effects of conversion on hospitals' communities? For this analysis, we examine changes in similar measures, but for neighboring hospitals, looking at both close (within five miles) and somewhat more distant (within 10 miles) neighbors, public hospitals, and major teaching (COTH) hospitals. The underlying null hypothesis in these tests is that there are no differences between neighbors of converting and control hospitals in the measures examined.

## Results

### *Characteristics of Converting and Control Hospitals*

In Table 2, we report the baseline characteristics of the hospitals that actually converted to for-profit ownership and the control hospitals, i.e., those with a high predicted probability of conversion that remained under private, nonprofit ownership. The predicted probability of conversion is 3.30 percent for the hospitals that actually changed ownership, compared to 6.69 percent for the control group. Actual converters and the control group are very similar in many of their market-area and hospital characteristics, which suggests that the hospitals selected as controls are indeed similar to hospitals that actually changed ownership.

This conclusion was reinforced by comparing the operating status of the converting and control hospitals in 1996. Approximately 70 percent of both sets were still operating as independent short-term general hospitals, 4 percent of controls and 5.7 percent of converters had merged with another hospital, and the remainder were either closed (16.2 percent of converters and 13.2 percent of controls), operating as some other type of facility, or could not be located in the AHA Annual Survey, and in all likelihood were closed. (Multivariate analysis controlling for the time since conversion and changes

in county characteristics confirms the conclusion that there was no difference between actual converters and similar controls in the likelihood of operating as a short-term general hospital in 1996.)

#### *Before and After Comparisons*

We compared changes before and after conversion by looking at average annual percentage changes in measures of community benefit and hospitals' expenses and profitability for three time periods: the three years prior to and including the year of conversion, the three years following conversion, and the five years following conversion. (Sample sizes for the three time periods differ because the observation period may be truncated for hospitals and controls from years near the beginning (1983) or end (1996) of the overall observation period, and to a lesser extent because of item-specific missing data from the underlying sources.)

We tested for differences between converting hospitals and control hospitals by estimating multivariate regression models that controlled for the year of conversion, and the changes in the percentage of the population enrolled in HMOs and in per capita income, which are both measured for the hospital's county.

In Table 3, we report the average annual percentage changes for the specific measures we analyze. Community benefit is measured by changes in the numbers of births at the hospital, emergency room visits, total outpatient visits, and inpatient Medicaid discharges. Changes in cost and profitability are measured by the changes in two input measures, total beds and total full-time-equivalent (FTE) employment, in total hospital expenses, and in the profit rate.

In Tables 4 and 5, we show the coefficients from the regression models for these variables for each of the three time periods. The coefficient of the variable *convert* indicates the difference between the changes for converting hospitals and the control group. From Table 4, we see that there were no statistically significant differences between converting hospitals and similar control hospitals in either the percentage changes in births or emergency room visits, both before and after conversion.

Converting hospitals did have some significant differences relative to similar control hospitals in changes in total outpatient visits and Medicaid inpatient discharges. Converting hospitals' total outpatient visits grew more slowly than similar control hospitals in the time periods following conversion, significantly so over the first three years and at a similarly lower rate, though not statistically significant, over the longer five-year post-

conversion period. Converting hospitals also had significantly slower growth in Medicaid discharges in the years pre-conversion and over the five-year post-conversion period. There was no difference in the shorter, three-year post-conversion period.

In Table 5, we present the results of the comparisons of changes in input use (beds and FTE employees), total expenses, and overall profitability. In general, converting hospitals had either smaller changes in the growth of these measures or grew at statistically similar rates as the control hospitals. Differences in the change in profit rates over the three time periods were not significantly different from zero.

#### *Effects on Community Benefits and Uncompensated Care*

In this section, we report comparisons of the conversion and control hospitals along several dimensions of community benefit and uncompensated care:

1. whether the hospital ended or closed (a) inpatient services to AIDS patients, (b) emergency room services, or (c) inpatient services for alcohol or drug abuse between 1993 and 1996 (we also explored trauma and burn care units, but too few of the converting and similar control hospitals offered either of these services in 1993 to allow a meaningful analysis of whether hospitals dropped the service by 1996);
2. the hospital's community orientation as measured by a series of questions asked as part of the 1996 AHA Annual Survey;
3. percentage changes between 1993 and 1996 in the volume of inpatient discharges to populations who might be characterized as vulnerable (Medicare, Medicaid) and changes in the volume of services that tend to attract vulnerable populations (emergency visits, outpatient visits, and births).

In each of the tables that follow, we show the proportion of hospitals or the percentage change in a measure by the hospitals' case/control status. We then test whether the differences between the converting hospitals and the similar control hospitals are significantly different when one holds constant the effects of the time since conversion and changes in local market characteristics.

In Table 6, we examine whether hospitals that offered or provided a service in 1993 reported not having that service in 1996. The largest changes occurred with regard to inpatient AIDS services, with between 29 percent and 39 percent of hospitals reporting

that they no longer provided the service in 1996 (though these figures may reflect a change in questionnaire wording). Smaller proportions of hospitals dropped either emergency department services or inpatient alcohol/drug abuse services. While hospitals that changed ownership were more likely than similar control hospitals to drop each of these services, none of the differences in relative odds were statistically significant.

Table 7 compares hospitals' responses to a series of questions about their community orientations. Hospitals that converted were generally either the same as the controls or more likely to engage in a community benefit activity than the controls in eight of the nine areas addressed. In only one case, "...working with other providers, public agencies, or community representatives to conduct a health status assessment of the community," were the conversion hospitals significantly less likely to answer "yes."

In Table 8, we compare changes between 1993 and 1996 in care to vulnerable populations, looking at changes in the numbers of Medicare and Medicaid discharges and changes in services that tend to be used more frequently by vulnerable populations, especially uninsured and Medicaid patients. None of the differences between the conversion and control hospitals in any of these measures was statistically significant using data from the AHA Annual Survey.

Overall, Tables 6–8 indicate virtually no difference in community benefit or care to vulnerable populations between hospitals that changed ownership and a set of similar control hospitals that had a high predicted probability of converting from private, nonprofit to for-profit ownership but did not, at least as of 1994. The fixed time period 1993–1996 is eight to ten years after conversion for almost 45 percent of the converting hospitals, which changed ownership in 1985–86 (Table 3). It may be that this relatively long post-conversion period eradicates changes that were merely short-term adjustments to ownership transfer. In effect, over time, converted hospitals look more and more like nonprofit hospitals that had been in similar circumstances and had similar characteristics at the time of conversion.

#### *Effects on Hospitals' Communities*

In order to assess the effects of hospital conversions on their communities, we identified all other short-term general nonfederal hospitals within a 10-mile radius based on the latitudes and longitudes of the population centroids of hospitals' five-digit zip codes. Neighboring hospitals were identified for both converting and control hospitals.

We first examine percentage changes in the numbers of Medicare and Medicaid discharges using AHA Annual Survey data for 1993 and 1996. The simple and adjusted percentage changes for neighbors of conversion, similar control, and contrast control hospitals are shown in Table 9. The table reports percentage changes in all neighboring hospitals within five miles of a case/control hospital, and in subsets of public and major teaching (COTH) hospitals. (Figures in parentheses are the adjusted differences from regression models based on neighboring hospitals within 10 miles of a case/control hospital.) The results suggest that neighbors of conversion hospitals, especially COTH members, had larger increases in both Medicaid and Medicare case loads. However, none of the differences relative to neighbors of similar control hospitals are statistically significant.

In Table 10, we look at change in the volume of service associated with care to disadvantaged populations, emergency visits, total outpatient visits, and births. None of the differences in changes in either emergency or total outpatient visits are statistically significant, nor are they suggestive of a pattern of shifting care to neighbors of converting hospitals. Nearby COTH neighbors of converting hospitals had a larger increase in emergency visits, but neighboring public hospitals had a larger decrease in emergency visits. The only statistically significant difference between neighbors of converting and similar control hospitals is in births, which went up by an adjusted difference of 8.1 percent for all neighbors, driven primarily by a 30 percent increase at COTH neighbors of converting hospitals.

## Conclusions

This report presented results of several statistical analyses of the effects of hospital ownership conversion on a variety of measures of community benefit. The analyses covered conversions that occurred throughout the nation between 1985 and 1994. It also examined possible spillover effects on neighboring hospitals within five miles of a hospital that converted ownership. Lastly, the experiences of conversion hospitals and their neighbors were compared to a statistically similar set of control hospitals, based on the predicted probability of their converting to for-profit ownership.

We measured the potential effects of ownership conversion by comparing changes between 1993 and 1996 in the conversion hospitals and their controls, and in the neighbors of the conversion and control hospitals. These comparisons were based on multivariate regression models that control for changes in hospitals' local markets: HMO growth, population growth, changes in per capita income and unemployment, and the state-level change in Medicaid coverage. We also analyzed before-and-after changes in both converting and control hospitals.

With very few exceptions, the fixed-period (1993–1996) comparisons found almost no difference either between the conversion hospitals and the set of control hospitals, or between the neighbors of the conversion hospitals and the neighbors of the set of control hospitals. The only statistically significant difference was in the percentage change in the number of births, which increased more in the neighbors of the conversion hospitals than in hospitals that were neighbors of the control group.

The before-and-after analyses, which examined variable time periods, found slower growth in total outpatient visits and Medicaid discharges in the converting hospitals compared to the control hospitals. However, in analyses not shown, a second set of control hospitals, which had a very low probability of converting to for-profit ownership, also had slower growth in these measures of community benefit (Hadley, Gray, and Collins, 2000). This would suggest that factors other than ownership conversion might have contributed to the differences observed. Moreover, the fact that these differences essentially disappeared by the end of the overall observation period also suggests that they may be transitory. While ownership differences may affect the level of community benefit, once hospitals have adjusted to those levels, the form of ownership may not affect subsequent changes.

The analyses of changes in input use, costs, and profit rates indicate that converting hospitals constrained their input and cost growth in the three years prior to conversion more than the control hospitals. However, after conversion, input and cost growth were very similar in the converting and control hospitals. Moreover, there were no significant differences in changes in the profit rate, suggesting that revenue changes paralleled cost changes in both sets of hospitals.

Although this study examined a large number of hospitals and a broad array of measures, it should be noted that the specific measures may be less than ideal, since we relied primarily on aggregate data reported on the AHA's Annual Survey of Hospitals. It was not possible to verify the reliability or accuracy of these data, nor were the data reported for all of the hospitals in each of the sets we were comparing. Moreover, these data may not be able to capture possibly subtle effects on access and quality of care for low-income people either treated by these hospitals or living near them. A potential analytic limitation is that the statistical analyses did not control for whether the neighbors of conversion and control hospitals were located in areas where the conversion or control hospital had closed.

Finally, it should be emphasized that the results we report represent the average experiences of hospitals that converted and their communities. This does not, by any means, imply that they apply uniformly to every single case of a hospital changing ownership. Thus, while it does not appear to be necessary to apply blanket restrictions or barriers to changes in ownership from nonprofit to for-profit status for reasons associated with community benefits, it still may be appropriate to screen and review selected instances that involve larger hospitals with a measurable contribution in the form of special services or a large volume of care to Medicaid and uninsured people. Moreover, this analysis has not addressed the financial aspects of hospital conversions, such as the valuation and transfer of assets and the recouping of accumulated tax benefits provided to nonprofit hospitals. These issues may very well remain relevant and legitimate reasons for continuing public review of hospital ownership conversions.

## REFERENCES

- Chollet, D. J., and A. M. Kirk. "A Case-Study Investigation of Charity Care and Essential Service Provision Following Hospital Conversion to For-Profit Status." Unpublished manuscript #9907, Public Policy Institute, American Association of Retired People, Washington, D.C., 1999.
- Hadley, J., B. H. Gray, and S. Collins. "A Statistical Analysis of the Impact of Nonprofit Hospital Conversions on Hospitals and Communities, 1985–1996." Institute for Health Services Research and Policy, unpublished working paper IWP 99–118, Georgetown University, Washington, D.C., 2000
- Mark, T. L. "Analysis of the Rationale for, and Consequences of, Nonprofit and For-Profit Ownership Conversions." *Health Services Research* 34 (April 1999): 83–101.
- Mullner R., and J. Hadley. "Interstate Variations in the Growth of Chain-Owned Proprietary Hospitals, 1973–1982." *Inquiry* 21 (Summer 1999): 144–151.
- Needelman, J., J. Lamphere, and D. Chollet. "Uncompensated Care and Hospital Conversions in Florida." *Health Affairs* 18 (July/August 1999): 125–133.
- Young, G. J., K. R. Desai, and C. V. Lukas. "Does the Sale of Nonprofit Hospitals Threaten Health Care for the Poor?" *Health Affairs* 16 (January/February 1997): 137–141.
- Young, G. J. and K. R. Desai. "Nonprofit Hospital Conversions and Community Benefits: New Evidence from Three States." *Health Affairs* 18 (September/October 1999): 146–155.

Table 1  
Mean Values, Logistic Regression Coefficients, and P-Values:  
Model to Predict the Probability of Hospital Conversion

Variable Name	Mean	Coefficient	P-Value
Percent For-Profit Beds in State	13.7	3.07	0.01
County Variables			
Per Capita Income	\$14,559	-0.00013	0.01
Percent Enrolled in HMOs	8.7	1.19	0.09
Percent Covered by Medicare	14.0	3.08	0.24
Five-Year Percent Change in Population	5.6	1.94	0.07
Population per Square Mile	753	0.000067	0.35
Herfindahl Index	0.46	-0.64	0.27
Public Hospital Dummy	43.2	0.22	0.44
COTH Hospital Dummy	29.6	0.33	0.31
Percent Medicaid Admissions	10.4	-1.24	0.54
Percent For-Profit Beds	8.5	0.62	0.36
Hospital Variables			
Burn Unit Dummy	15.3	0.23	0.67
Part-of-a-Chain Dummy	52.6	0.45	0.05
Contract Management Dummy	12.5	0.43	0.11
ER Dept. Dummy	93.2	-1.21	<0.01
Pediatric ICU Dummy	10.4	-0.37	0.42
Medical/Surgical ICU Dummy	79.5	0.05	0.90
Neonatal ICU Dummy	66.2	-0.10	0.80
Open-Heart Surgery Dummy	28.7	0.96	0.01
Transplant Unit Dummy	7.5	-1.52	0.07
Percent Long-Term-Care Admissions	0.9	-0.42	0.91
Percent Medicaid Admissions	11.4	1.56	0.22
OB Level 1 Dummy	42.4	-0.36	0.13
OB Level 2 Dummy	30.6	-0.95	0.01
OB Level 3 Dummy	9.1	-0.93	0.10
FTE Interns and Residents	8.2	0.0056	0.16
Total Beds	206	-0.0025	0.05
ER Visits per Inpatient Admissions	2.8	-0.056	0.40
Church Control Dummy	25.3	-0.60	0.04
Year Dummies			
1986	10.5	-0.35	0.27
1987	10.2	-0.87	0.06
1988	9.9	-1.60	0.01
1989	9.8	-0.91	0.08
1990	9.9	-1.80	0.01
1991	9.9	-0.56	0.31
1992	9.7	-0.53	0.37
1993	9.8	0.03	0.97
1994	9.7	-0.39	0.55

Table 2  
Base Year Characteristics (Mean Value) of Converting and Control Hospitals

Variable Name	Case/Control Status	
	Convert	Control
Number of Hospitals	(105)	(278)
Predicted Probability of Conversion	3.30%	6.69%
Percent For-Profit Beds in State	18.6	21.9
<b>County Variables</b>		
Per Capita Income	\$13,416	\$12,777
Percent Enrolled in HMOs	10.8	11.6
Percent Covered by Medicare	13.7	13.4
Five-Year Percent Change in Population	9.9	4.7
Population per Square Mile	828	846
Herfindahl Index	0.37	0.32
Public Hospital Dummy	60.0	71.9
COTH Hospital Dummy	40.0	45.5
Percent Medicaid Admissions	10.6	10.3
Percent For-Profit Beds	14.1	18.5
<b>Hospital Variables</b>		
Burn Unit Dummy	3.8	2.9
Part-of-a-Chain Dummy	56.2	56.8
Contract Management Dummy	20.0	23.0
ER Dept. Dummy	72.4	32.0
Pediatric ICU Dummy	6.7	2.5
Medical/Surgical ICU Dummy	66.7	42.4
Neonatal ICU Dummy	41.0	17.3
Open-Heart Surgery Dummy	23.8	16.9
Transplant Unit Dummy	1.9	0.0
Percent Long-Term-Care Admissions	0.6	0.3
Percent Medicaid Admissions	11.4	10.9
OB Level 1 Dummy	40.0	30.6
OB Level 2 Dummy	14.3	1.8
OB Level 3 Dummy	4.8	1.1
FTE Interns and Residents	5.6	2.3
Total Beds	154	110
ER Visits per Inpatient Admissions	2.4	2.2
Church Control Dummy	17.2	12.2

Table 3  
Average Annual Percentage Changes in Community Benefit and  
Cost/Profit Measures, by Time Period

Time Period and Measure	Case/Control Status	
	Convert	Control
Three Years Pre-Conversion		
Births	2.36	-2.94
Emergency Room Visits	7.90	4.29
Total Outpatient Visits	5.83	5.92
Medicaid Discharges	4.52	17.37
Total Beds	-2.01	1.77
Total FTE Employees	-2.91	2.85
Profit Rate <sup>a</sup>	0.49	3.89
Three Years Post-Conversion		
Births	-1.69	-2.29
Emergency Room Visits	8.02	9.42
Total Outpatient Visits	13.43	19.16
Medicaid Discharges	6.76	7.06
Total Beds	-0.36	2.05
Total FTE Employees	1.55	2.59
Profit Rate <sup>a</sup>	1.41	2.46
Five Years Post-Conversion		
Births	3.23	-0.22
Emergency Room Visits	7.09	10.58
Total Outpatient Visits	16.13	20.44
Medicaid Discharges	3.74	12.78
Total Beds	-0.28	1.18
Total FTE Employees	1.45	3.85
Profit Rate <sup>a</sup>	-3.70	-1.09

<sup>a</sup> Absolute change.

Table 4  
 Before-and-After Comparisons of Converting and Control Hospitals, Percentage  
 Changes in Measures of Care to Vulnerable Populations (regression coefficients)

Time Period and Independent Variable	Births	Emergency Room Visits	Total Outpatient Visits	Medicaid Discharges
Three Years Pre-Conversion	(n=160)	(n=228)	(n=232)	(n=220)
Convert <sup>a</sup>	2.40	0.96	-1.40	-10.38***
Year of Conversion	-0.64	-0.31	-0.85**	0.36
Change in HMO Percentage <sup>b</sup>	1.28	-27.22**	-28.18**	11.43
Change in Per Capita Income (1,000s) <sup>c</sup>	1.29	0.44	1.14	-0.36
Three Years Post-Conversion	(n=260)	(n=347)	(n=361)	(n=354)
Convert	-0.01	-1.85	-5.90***	-1.70
Year of Conversion	0.34	-0.89**	-0.43	0.44
Change in HMO Percentage	3.08	-0.83	-0.52	-20.46
Change in Per Capita Income (1,000s)	0.10	0.10	-1.65	1.95***
Five Years Post-Conversion	(n=189)	(n=246)	(n=256)	(n=247)
Convert	2.52	-2.88	-5.56	-11.19*
Year of Conversion	-0.40	-0.69	1.23	1.27
Change in HMO Percentage	12.62	-2.51	-14.88	2.12
Change in Per Capita Income (1,000s)	-0.55	0.59	-2.17***	1.73

<sup>a</sup> The number of hospitals varies for each time period because data were not available for all hospitals for three years before or five years after conversion, given the upper (1996) and lower (1983) boundaries of the available cases.

<sup>b</sup> Difference in change relative to a control hospital.

<sup>c</sup> Change between conversion year and reference year.

\*  $p \leq 0.01$ .

\*\*  $0.01 < p \leq 0.05$ .

\*\*\*  $0.05 < p \leq 0.10$ .

Table 5  
 Before-and-After Comparisons of Converting and Control Hospitals, Percentage  
 Changes in Measures of Capacity, Cost, and Profitability (regression coefficients)

Time Period <sup>a</sup> and Variable	Percentage Change in:			
	Total Beds	Total FTE Employees	Total Expenses	Profit Rate
Three Years Pre-Conversion	(n=234)	(n=234)	(n=234)	(n=169)
Convert <sup>b</sup>	-3.51**	-4.83*	-8.75*	1.10
Year of Conversion	-0.11	4.39***	-0.75**	0.93
Change in HMO Percentage <sup>c</sup>	-9.78***	-16.20*	-15.86	-15.61
Change in Per Capita Income <sup>c</sup>	0.50	1.67*	1.50***	0.37
Three Years Post-Conversion	(n=370)	(n=369)	(n=368)	(n=296)
Convert	-0.93	-0.66	1.07	-1.50
Year of Conversion	-0.19	0.22	-0.04	-0.25
Change in HMO Percentage	-0.60	-5.50	-4.51	-4.67
Change in Per Capita Income	0.03	0.16	-0.25	1.96
Five Years Post-Conversion	(n=259)	(n=259)	(n=258)	(n=207)
Convert	-1.47***	-1.82	0.91	-2.36
Year of Conversion	-0.02	-0.04	-0.84**	0.40
Change in HMO Percentage	-1.72	-3.23	1.92	25.86
Change in Per Capita Income	0.10	0.02	0.23	-1.23

<sup>a</sup> The number of hospitals varies for each time period because data were not available for all hospitals for three years before or five years after conversion, given the upper (1996) and lower (1983) boundaries of the available cases.

<sup>b</sup> Difference in change relative to a nonconverting, similar control hospital.

<sup>c</sup> Change between conversion year and reference year.

\*  $p \leq 0.01$ .

\*\*  $0.01 < p \leq 0.05$ .

\*\*\*  $0.05 < p \leq 0.10$ .

Table 6  
 Closure of Community Benefit Services, 1993–1996, by Case/Control Status

Service	Case/Control Status	
	Convert	Control
<b>Inpatient AIDS</b>		
Percent dropping	36.2	28.7
Adjusted relative odds	1.30	1.00
<b>Emergency Room</b>		
Percent dropping	14.3	12.6
Adjusted relative odds	1.12	1.00
<b>Inpatient Alcohol or Drug Unit</b>		
Percent dropping	9.5	4.0
Adjusted relative odds	2.23	1.00

Table 7  
Differences in Community Orientation, 1996, by Case/Control Status

Measure of Community Orientation	Case/Control Status	
	Convert	Control
<i>Does the hospital's mission statement include a focus on community benefit?</i>		
Percent yes	96.4	97.8
Adjusted relative odds	0.72	1.00
<i>Does the hospital have a long- term plan for improving the health of the community?</i>		
Percent yes	78.6	83.7
Adjusted relative odds	0.71	1.00
<i>Does the hospital have resources for the community benefit activities?</i>		
Percent yes	84.2	84.6
Adjusted relative odds	0.96	1.00
<i>Does the hospital work with other providers, public agencies, or community representatives to conduct a health status assessment of the community?</i>		
Percent yes	66.1	80.2
Adjusted relative odds	0.51***	1.00
<i>Does the hospital use health status indicators for defined populations to design or modify services?</i>		
Percent yes	73.2	56.0
Adjusted relative odds	2.31**	1.00
<i>Does the hospital work with other local providers, public agencies, or community representatives to develop a written assessment of the appropriate capacity for health services in the community?</i>		
Percent yes	56.4	60.2
Adjusted relative odds	0.92	1.00
<i>Has the hospital used the assessment to identify unmet health needs, excess capacity, or duplicative services in the community?</i>		
Percent yes	57.5	57.5
Adjusted relative odds	1.10	1.00
<i>Does the hospital work with other providers to collect, track and communicate clinical and health information across cooperating organizations?</i>		
Percent yes	79.0	52.2
Adjusted relative odds	3.98*	1.00
<i>Does the hospital, alone or with others, disseminate reports to the community on the quality and costs of health care services?</i>		
Percent yes	64.3	50.6
Adjusted relative odds	1.89***	1.00

\*  $p \leq 0.01$ .

\*\*  $0.01 < p \leq 0.05$ .

\*\*\*  $0.05 < p \leq 0.10$ .

Table 8  
 Percentage Changes, 1993–1996, in Inpatient Discharges and Services  
 for Vulnerable Populations, by Case/Control Status  
 (National Data from AHA Annual Survey)

	Case/Control Status	
	Convert	Similar Control
<b>Medicare</b>		
Percent change	16.6	16.4
Adjusted difference	-0.40	REF
<b>Medicaid</b>		
Percent change	28.3	21.6
Adjusted difference	4.17	REF
<b>Emergency Visits</b>		
Percent change	9.8	11.9
Adjusted difference	0.33	REF
<b>Total Outpatient Visits</b>		
Percent change	37.8	46.9
Adjusted difference	-6.31	REF
<b>Births</b>		
Percent change	6.1	3.7
Adjusted difference	4.51	REF

Table 9  
 Percentage Changes, 1993–1996, in Inpatient Discharges for Vulnerable  
 Populations for “Neighbors” Within Five Miles of Case/Control Hospitals,  
 by Neighbors’ Ownership and Teaching Status

Population and Type of Neighbor	Case/Control Status	
	Convert	Control
<b>Medicare</b>		
All Neighbors (N=484)		
Percent change	10.7	7.3
Adjusted difference	1.90 (-0.11) <sup>a</sup>	REF
Public Neighbors (N=44)		
Percent change	1.2	8.0
Adjusted difference	-2.56 (-2.16)	REF
COTH Neighbors (N=55)		
Percent change	7.3	2.3
Adjusted difference	11.8 (13.3)	REF
<b>Medicaid</b>		
All Neighbors (N=457)		
Percent change	21.9	10.00
Adjusted difference	14.14 (5.51)	REF
Public Neighbors (N=41)		
Percent change	0.3	8.0
Adjusted difference	-5.5 (-12.2)	REF
COTH Neighbors (N=54)		
Percent change	4.6	-10.7
Adjusted difference	8.3 (3.55)	REF

<sup>a</sup> Figures in parentheses are adjusted differences for neighbors within 10 miles.

\*  $p \leq 0.10$ .

Table 10  
 Percentage Changes, 1993–1996, in Services Associated with Vulnerable  
 Populations for “Neighbors” Within Five Miles of Case/Control Hospitals,  
 by Neighbors’ Ownership and Teaching Status

Service and Type of Neighbor	Case/Control Status	
	Convert	Control
<b>Emergency Visits</b>		
All Neighbors (N=469)		
Percent change	4.8	9.7
Adjusted difference	-5.64 (-4.04) <sup>a</sup>	REF
Public Neighbors (N=75)		
Percent change	-8.3	14.0
Adjusted difference	-14.79 (-8.02)	REF
COTH Neighbors (N=47)		
Percent change	3.1	-4.6
Adjusted difference	14.9 (0.78)	REF
<b>Total Outpatient Visits</b>		
All Neighbors (N=463)		
Percent change	26.4	25.2
Adjusted difference	4.83 (5.53)	REF
Public Neighbors (N=40)		
Percent change	22.8	25.4
Adjusted difference	-11.40 (-10.87)	REF
COTH Neighbor		
Percent change	11.9	15.7
Adjusted difference	1.2 (13.93)	REF
<b>Births</b>		
All Neighbors (N=349)		
Percent change	2.9	-4.9
Adjusted difference	8.10** (8.86*)	REF
Public Neighbors (N=63)		
Percent change	-13.2	-13.7
Adjusted difference	9.95 (0.80)	REF
COTH Neighbors (N=73)		
Percent change	1.1	-15.4
Adjusted difference	30.38** (19.32***)	REF

<sup>a</sup> Figures in parentheses are adjusted differences for neighbors within 10 miles.

\*  $p \leq 0.01$ .

\*\*  $0.01 < p \leq 0.05$ .

\*\*\*  $0.05 < p \leq 0.10$ .