

# Hospital Closures and Survivals: An Analysis of Operating Characteristics and Regulatory Mechanisms in Three States

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*This article examines factors related to hospital closures, using a longitudinal sample of surviving and closed hospitals. The hospitals are drawn from three states with different regulatory programs. Size of hospital and occupancy rate are shown to be related to likelihood of closure, while ownership, length of stay, and expenditures are not. These findings are observed both in the aggregate and within the individual states between 1960 and 1980. The three states—Arizona, Pennsylvania, and Maryland—represent different population trends and regulatory mechanisms and goals. The findings indicate that some programs appear to guarantee survival, whereas others are more neutral.*

## INTRODUCTION

The United States has relied on expanding resources to solve its economic redistribution problems, but the country unfortunately lacks a political structure for allocating losses. Attempts to cut back the hospital industry are an example of this problem [1]. Financial resources are being restricted in an effort to slow increases in hospital costs without examining whether the resulting losses are in those institutions and services least needed by the communities served.

Analysis of why some hospitals fail while others survive and prosper

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and still others appear to hover on the brink of bankruptcy seems to follow two lines of argument. The first is that the birth, survival, and death of hospitals is a natural process in which the fittest survive and those without sufficient resources fail. This libertarian argument assumes a market effect of neutral forces such that the organizations which best fit the needs and demands of consumers will survive. The second argument is that organizations fail as a result of political forces. Planning agencies or other regulatory bodies at either the federal, state, or local level are cast as the villains. These agencies, it is argued, induce hospitals to close, and eventually the doors are shut. If most hospital closures could be neatly classified into one of these two categories, policymakers would confront a relatively simple task: encourage market challenges or, alternatively, strengthen regulatory forces.

Neither the market forces nor the political forces argument answers the question of why some hospitals close and others survive. What appear to be market forces are often a more deliberate and complex vector of community and political withdrawal of support for an institution. What appear to be political forces are often a complex coming together of market forces in the face of inadequate management, a decline in trustee commitment, an impossible payer mix, and powerful competitive pressures.

In the literature dealing with hospital closures, three factors have been noted as having some bearing upon the likelihood of a hospital's closing. These factors are: (1) operating characteristics, (2) ownership, and (3) competition. Operating characteristics include occupancy rate, cost per patient-day, cost per length of stay, accounts receivable, bad-debt ratios, and net operating expenditures. Although other factors are clearly involved, hospitals characterized by high average costs (and inefficient operations) for a given case mix and outcome would be thought more likely to close [2-4].

Form of ownership bears upon both operating characteristics and political decision making. Public hospitals, traditionally dependent upon the financial viability of local governments, are viewed as suffering disproportionately since the onset of the fiscal crises of cities in the mid-1970s [5]. Individually owned proprietary hospitals, the ownership type most affected by market forces, are seen as the most volatile, whereas proprietary hospitals that are part of corporate chains are considered more stable. Whether a proprietary hospital is individually owned or part of a large corporate entity has a bearing on unplanned versus planned closings: the planned closings are more likely to be the result of specific management decisions rather than unanticipated inability to survive in a changing environment. Voluntary hospitals are dominant both in

number of hospitals and in number of beds, and they should be the most stable.

Competition may also have an effect on closings and openings [6]. Hospitals that are underutilized and in areas with other, equivalent facilities may be more likely to close than single providers in areas of sufficient population and health care resources. Research in this area has generally been limited to case studies of hospitals that have already closed. To examine the role of competition, one must determine whether the closure resulted from a decline in market share as a result of better marketing by the surviving hospitals in attracting consumers, physicians, and technology from the closed hospital. It is a matter of some regret, therefore, that the relationship between competition and closure has not progressed beyond descriptive evidence [7,8].

The literature has also paid insufficient attention to an important fourth factor: regulation. Government regulation makes its impact felt through reimbursement mechanisms [9,10]. It has been argued that some forms of regulation result in the closing of hospitals that otherwise might not be closed, while other forms of regulation insure hospital survival that is not justified on other grounds. For example, Maryland's program explicitly mandates survival, while New York's encourages closures.

Beginning in the 1970s, planned efforts to close hospitals have become more frequent [7]. Since then, there has been growing pressure for planned closing of hospitals considered to be marginal in their operations. As such, it is important to establish appropriate criteria for decisions to close and to verify that these criteria reflect marginality of need. Effective and equitable public policy for planned closure requires as a starting point a broad base of statistical evidence dealing with hospital failure.

The purpose of this article is to identify empirically the key factors in hospital closure, based upon a large longitudinal sample that includes both surviving and closed hospitals. The hospitals are drawn from three states with different regulatory programs, and the sample permits the examination of the effects of the regulatory climate on the likelihood of hospitals' surviving or closing. A review of the literature on closure is presented, along with the data and methods of the study and its results.

## REVIEW OF THE LITERATURE

Much of the literature on closed or financially distressed hospitals has consisted of news and feature or opinion articles discussing the problem. Studies published to date have addressed a variety of issues and have

included descriptions of closed hospitals' operating characteristics, financial positions, external environments, and reasons for closure, as shown in Model I.

The type of hospital most likely to close has been fairly well documented: it tends to have fewer than 100 beds [2,8,11-13] and offers fewer services than its counterparts [8,13]. Proprietary hospitals close at disproportionately high rates: while making up only 12 percent of all hospitals, they account for over 45 percent of closures [2,8,11-13]. Some of these closures are planned, part of management strategy for dealing with market forces, and some are unplanned. Closed hospitals are more likely to be located in metropolitan areas, but this differential is fairly small [12]. There are, however, marked regional differences in closure rates, with the East and West South Central and the Pacific census divisions having disproportionately high rates, while the East and West North Central, the South Atlantic, the New England, and the Mountain divisions have disproportionately low rates [11-13]. The former areas contain most of the proprietary hospitals, and this may account for the higher rates. Mullner, Byre, Levy, and Kubal have recently completed a study in which they combine the descriptive characteristics of ownership, size, and location into a multiple regression model; they find significant correlations between all variables and hospital closures [13].

The operational characteristics of closed hospitals have been less thoroughly documented. Cannedy, Ruchlin, and Pointer noted that hospitals which close tend to have lower occupancy rates, fewer admissions, lower expenses, and fewer employees than a matched sample of hospitals that remain open. Their research included development of a regression model according to which variations in expenses and occupancy rates explain only 19 percent of the variation in closure rates when controlled for size, ownership, and location [2].

The financial characteristics of closed or distressed hospitals have been the subject of a number of studies. Carauna found that a sample of ten New York City hospitals had poorer liquidity, capital structure, and profitability ratios than a sample of ten similar hospitals located in other parts of the country [14]. He found that the financial position of all 20 hospitals deteriorated between 1974 and 1978, but the New York hospitals suffered more serious deterioration [15]. Cleverley has studied various financial measures of 15 New York State hospitals that closed between 1974 and 1978, looking at the hospitals one and four years prior to closure [3,4]. Although the measures generally moved in the anticipated direction, the change was not statistically significant, leading Cleverley to hypothesize that most of the deterioration in financial position occurs more than four years before closure. The results of this deterioration

include illiquidity, negative cash flow from operations, a preponderance of short-term debt, low depreciation, and negative operating margin and return on investment. The results of the Carauna and Cleverley studies must be viewed as tentative, since both relied upon small samples, drawn exclusively from New York.

Sager has examined the relationship between various community factors and the incidence of voluntary hospital closure and relocation in central cities [16,17]. The studies show that, of the hospitals open in those areas in 1937, over 40 percent have since closed or relocated. The incidence of closure and relocation is directly related to the percentage of minority population in the hospital's neighborhood. There is also a positive correlation with the percentage of Medicaid patients in the hospital's patient mix. No significant correlation was found between closure or relocation and citywide demographic characteristics or citywide bed capacity.

One study has attempted to ascertain the reasons hospitals gave for closing [11]. Executives in hospitals that closed between 1974 and 1977 were asked why they had decided to shut the hospitals down. The most frequently stated reason (multiple responses were allowed) was financial difficulty, mentioned by 26.8 percent of the respondents. Other frequently stated reasons included new facilities being built by either the hospital or a competitor (23.4 percent), low occupancy (14.3 percent), obsolete facility (13.4 percent), and lack of medical staff (10 percent). Larger hospitals tended to mention financial difficulty; smaller ones were more apt to cite lack of medical staff. One-third of the nonprofit hospitals cited financial reasons. Proprietary hospitals cited the construction of new facilities and public hospitals' changes in policy. Other studies have supported these findings, concluding that financial problems, low occupancy, and obsolete facilities are the most frequent reasons for hospital closure [18,19].

Little investigation of how and why hospitals find themselves in such desperate straits has been done. Sager theorizes that four factors determine closure: the hospital itself, the hospital's medical staff, the demographics of the hospital's neighborhood, and the citywide environment [17]. Ermann and Aronoff suggest that closure is most likely to occur in economically distressed areas [18]. McNeil links hospital viability to philanthropy and government spending on health care, both of which are functions of economic well-being [11].

In summary, most studies have concentrated upon describing the types of hospitals most likely to close—i.e., small, proprietary hospitals located in the South Central and Pacific regions. The demographic characteristics of closed hospitals indicate that closure becomes more

probable as the percentage of minorities and Medicaid recipients in the hospital's community rises. Closed hospitals also tend to have utilization and financial difficulties, such as illiquidity, lack of profits, and excessive debt. The literature reviewed does not contain any substantial treatment of possible relationships between hospital closure and one of the most recent and important influences on hospital behavior—regulation. In addition, there is no empirical study that allows regulation to be compared with efficiency and ownership as determinants of closure in states that have different regulatory approaches.

## DATA AND METHODS

The initial sample consists of all nonfederal short-term general hospitals in Arizona, Maryland, and Pennsylvania that were listed in the 1960 American Hospital Association Guide. These hospitals were tracked over 20 years. Hospitals built between 1960 and 1980 were also examined. The three states were selected because they have differing population trends and regulatory mechanisms, yet they are broadly representative of the national picture. Maryland has stringent rate setting, Pennsylvania does not regulate the industry, and Arizona falls in between, with written regulations but limited implementation. The population of Arizona has been increasing rapidly, that of Pennsylvania has been decreasing rapidly, and Maryland's population has declined moderately.

Data were collected for the years 1960, 1970, and 1980. In 1960, before Medicare and Medicaid were enacted, most hospitals depended upon philanthropy to underwrite their expenses. By 1970, the federal programs had been in place for five years and their impact on hospital functioning presumably would be reflected in the statistics. The various regulatory mechanisms were put in place in the early 1970s, so by 1980 their effects might be reflected in some hospital characteristics.

Over the sample period, the set of hospitals changed as shown in Table 1. Fifty-three hospitals changed ownership over the period, but they do not affect the size of the sample. Not all hospitals report data for each operating variable; hence, the subsequent analyses and tables do not always include all hospitals.

Efficiency, ownership, and regulation are compared in hospitals that closed and hospitals that did not close. Ownership is divided into three categories: public, voluntary, and proprietary. Efficiency is measured by occupancy rate, length of stay, cost per patient-day, and cost per illness episode. The three states represent distinct regulatory environments.

Although size is traditionally seen as an indicator of efficiency,

Table 1: Changes in Hospitals Between 1960 and 1980

<i>Hospitals</i>	<i>Change</i>
In operation in 1960	309
Closed between 1960 and 1980	-53
In operation in 1980 (from the original set only)	256*
Opened between 1960 and 1980	+68
In operation in 1980 (total)	324

\*Includes eight nonreporting hospitals.

Table 2: Summary of Rate Setting Mechanisms

<i>Mechanism</i>	<i>Arizona</i>	<i>Maryland</i>	<i>Pennsylvania</i>
Mandatory	Yes	Yes	No
Voluntary Compliance	Yes	No	Yes*
Statewide Norms Established	No	Yes	No
Hospital Survival Explicitly Guaranteed	No	Yes	No

\*As noted, western Pennsylvania has a voluntary program for some of its hospitals under a system managed by Blue Cross.

through (presumed) economies of scale, it is more logically interpreted as a measure of power. "Power" is the ability of an institution, relative to competing institutions in the same market, to secure resources from the external environment. Larger hospitals are more likely to have support from their boards of trustees and physicians, as well as from the community. In addition, larger hospitals are also more likely to maintain sophisticated managerial and clinical staffs to guarantee better access to capital markets and to negotiate effectively with reimbursement agencies.

Arizona, Maryland, and Pennsylvania have taken different approaches to hospital cost containment. These approaches correspond to the two major regulatory options available and in use in the United States: mandatory versus voluntary compliance with state recommendations on proposed rate increases, and the implied rejection of versus reliance on normal market forces to assure "good" pricing behavior by hospitals. Thus, Arizona and Pennsylvania allow for voluntary compliance, while Maryland mandates compliance. This contrast is highlighted in Table 2.

In 1972, Arizona enacted a system of mandatory hospital rate review with voluntary compliance. Maryland's system, also implemented in 1972, requires both mandatory rate review and mandatory rate setting. There is no statewide program in Pennsylvania, although Blue Cross of

Western Pennsylvania has been operating a voluntary prospective reimbursement plan among a number of its member hospitals since the early 1970s. This article does not analyze the different experiences between eastern and western Pennsylvania, although other research now under way will look at possible variations between the voluntary effort in western Pennsylvania and the free market arrangements in the eastern area of the state.

In Arizona, each health care institution is required to file regular standardized reports of its finances and operations. Proposed rate changes are examined both by local Health Systems Agencies (HSAs) and a small state agency. There are no statewide criteria against which rate changes are measured, although local HSAs may establish local norms. The two reviewing bodies make a joint recommendation about the rate request. Compliance is entirely voluntary [20].

Few recommendations have been rejected by Arizona's acute care hospitals, probably because the recommendations were unthreatening. In 1977, for example, only one of the 53 hospitals that filed for increases chose not to abide by a recommendation. A recent report by the Health Care Financing Administration concluded that the Arizona program "lacks the organizational structure, the legal sanctions, the financial incentives, and the political support and authority to be classified now or in the future as a rigorous program" [21,22].

Most observers of the Maryland Health Services Review Commission consider it to be a rigorous, even-handed, and effective program. The state's concern with rising health care costs dates to 1964, when a special commission recommended legislation to cap costs. A program was not adopted until 1971, when the state hospital association, prompted by the failure of a voluntary hospital in Baltimore and serious problems in other inner-city hospitals, abandoned its opposition and helped draft the act under which the state is now operating.

The commission established by this legislation is a semi-autonomous state agency with the power to set hospital rates. "Hospital rate setting in Maryland consists of three systems: rate review, inflation adjustment, and the guaranteed inpatient review (GIR) system, which seeks to control the volume of ancillaries and lengths of stay . . . GIR guarantees payment for each case treated by the hospital" [10]. Hospital expenditures in Maryland are regulated department by department. Interhospital comparisons set the norms. Most hospitals accept the automatic increases implicit in the formula; few have taken the next step, a public appeal, with its attendant risk of close public review. About one-third of the hospitals, primarily large voluntary hospitals, are regulated through the GIR system. This modification of the basic formula attempts to control volume increase by tying reimbursement to patient mix. Maryland's commitment to cost



containment is tempered somewhat by an explicit mandate to the review commission "to keep itself informed about the fundamental viability of each institution and to concern itself with solutions when resources are inadequate" [21].

Analyses were performed to determine whether there was any relationship between these different regulatory arrangements and hospital survival or closure.

## RESULTS

### OWNERSHIP

Model 2 summarizes the results of the study. Ownership is usually thought to be a significant factor in predicting the likelihood of closure. However, this assumption was generally not supported by the data. First, patterns of ownership over time were looked at. From 1960 to 1980 virtually no change occurred in the distribution of hospital ownership for the three states. This can be seen in Figure 1, which contains the percentage of hospitals by type of ownership in 1960, 1970, and 1980.

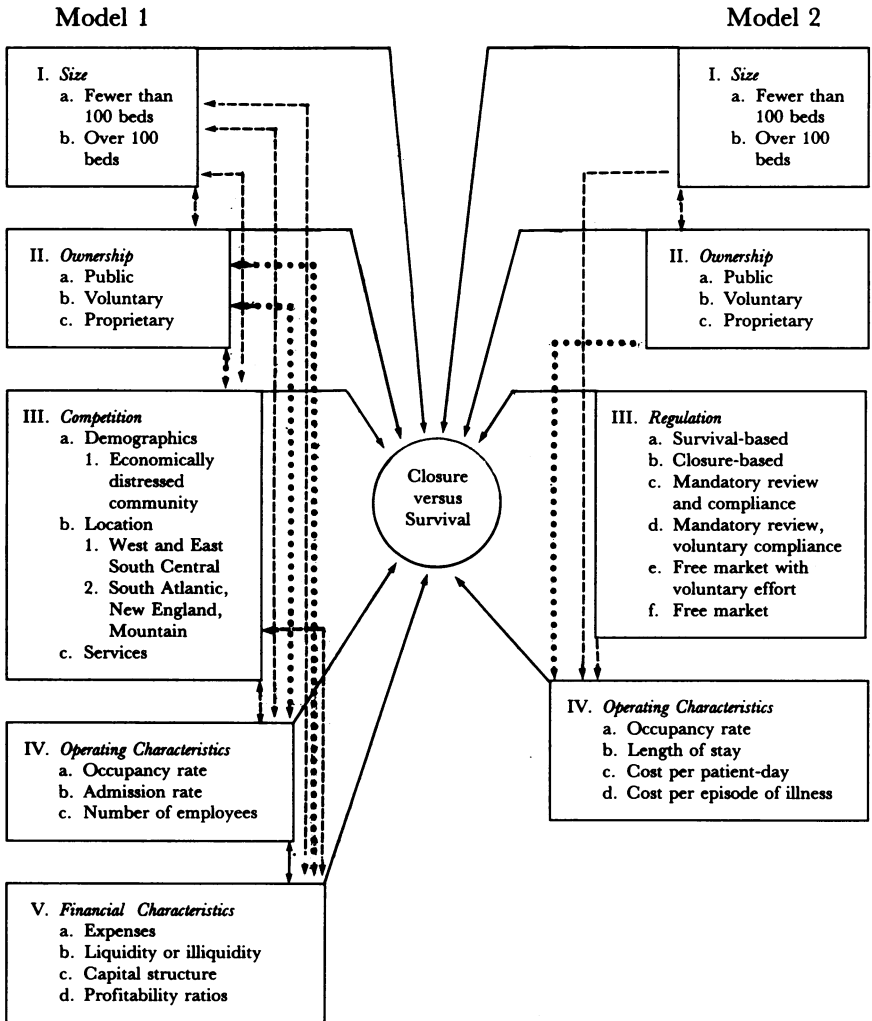
Next, closures by type of ownership were examined (Figure 2) for each decade. As expected, proprietary hospitals showed relatively more closures than did hospitals in other ownership categories. For both voluntary and public hospitals, however, the proportion of closures expected, based on the size of ownership category, was not significantly different ( $P > .05$ ) from the proportion of closures observed. A similar comparison made for new hospitals (openings) over the two decades showed the same results (Figure 3). Ownership patterns were found to be stable from 1960 to 1980; thus, ownership is a poor predictor of the likelihood of closing, opening, or surviving in these three states.

### OCCUPANCY

Occupancy rate is commonly considered an important factor in hospital survival. This assumption was borne out by the data: hospitals that closed were found to have significantly lower occupancy rates than did hospitals that survived. In fact, occupancy rates were lower for several years before actual closure.

Figure 4 contains occupancy rates for survivals and closures in two groups. The first group has occupancy rates in 1960: for hospitals that survived to 1980, for hospitals that closed by 1970, and for hospitals that closed by 1980. The second group has occupancy rates in 1970: for hospitals that survived to 1980 and for hospitals that closed by 1980.

In the first group, of the 284 hospitals existing in 1960 that reported

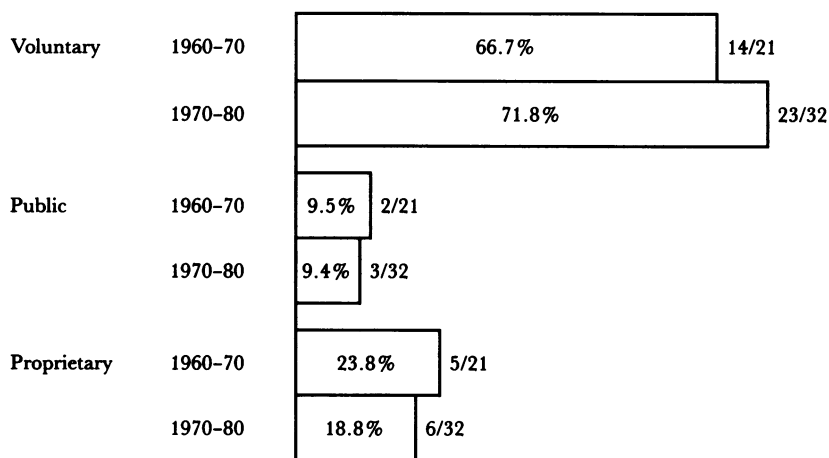


occupancy rates, 234 were still viable in 1980; their 1960 occupancy rate averaged 75.7%. By contrast, the 20 hospitals that closed by 1970 had an average 1960 occupancy rate of 65.5 percent, and the 30 additional hospitals that closed between 1970 and 1980 had an average 1960 occupancy rate of 60.0 percent. In the second group, of the 259 reporting hospitals existing in 1970, 234 survived to 1980; their 1970 average occupancy rate was 84.4 percent. The 1970 average occupancy rate of the 25 hospitals that closed by 1980 was only 66.9 percent.

Figure 1: Hospital Ownership

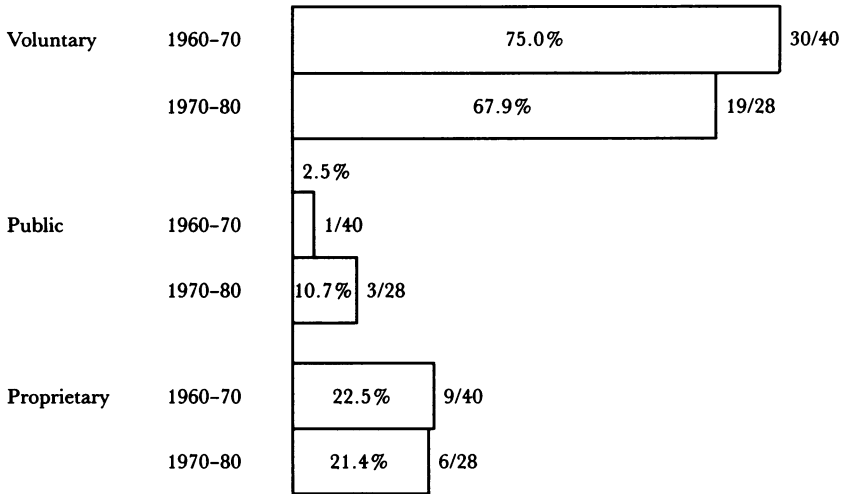
	Voluntary	Public	Proprietary	
1960	86.1% (266)	8.1% (25)	5.8% (18)	309 Hospitals
1970	87.7% (284)	6.8% (22)	5.5% (18)	324 Hospitals
1980	86.1% (273)	7.9% (25)	6.0% (19)	317 Hospitals

Figure 2: Ownership of Hospitals that Closed



In all cases, the differences between average occupancy rates of hospital survivals and closures were significant ( $P < .05$ ). Apparently, then, occupancy is an important factor in a hospital's ability to survive. It cannot be determined from these data, however, where there is some critical rate below which survival becomes less likely, or if occupancy rate reflects other factors that are more basic contributors to closure. This is an area for further study.

Figure 3: Ownership of Hospitals that Were Opened



**LENGTH OF STAY**

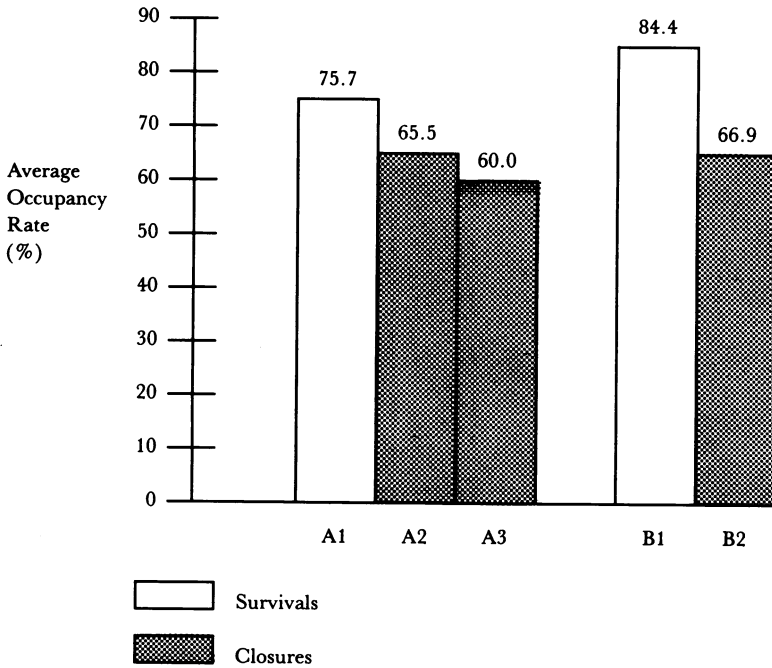
Length of stay is another measure commonly considered to be an important indicator of survivability, although the literature unfortunately fails to make a consistent distinction between per day reimbursement, where hospital survival is presumably enhanced by longer stays, and per case reimbursement, where survival is threatened by longer stays. Not surprisingly, therefore, length of stay was not found to be related to survival.

As with occupancy rates, comparisons were made in groups, using 1960 average length of stay in the first group and 1970 average length of stay in the second. These appear in Figure 5.

**EXPENDITURES**

Expenditures per patient-day show the same lack of significance in terms of survival as ownership and length of stay. Figure 6 shows expenditures (in current dollars) in the same groupings used for occupancy and length of stay. The hypothesis that there is no difference between survivals and closures in expenditures per patient day could not be rejected at  $P > .05$ . It should be noted, however, that limited data did not permit analysis of expenditures per patient day in the year or two prior to closure. It is possible that expenditures rose more for hospitals that closed.

Figure 4: Occupancy Rates

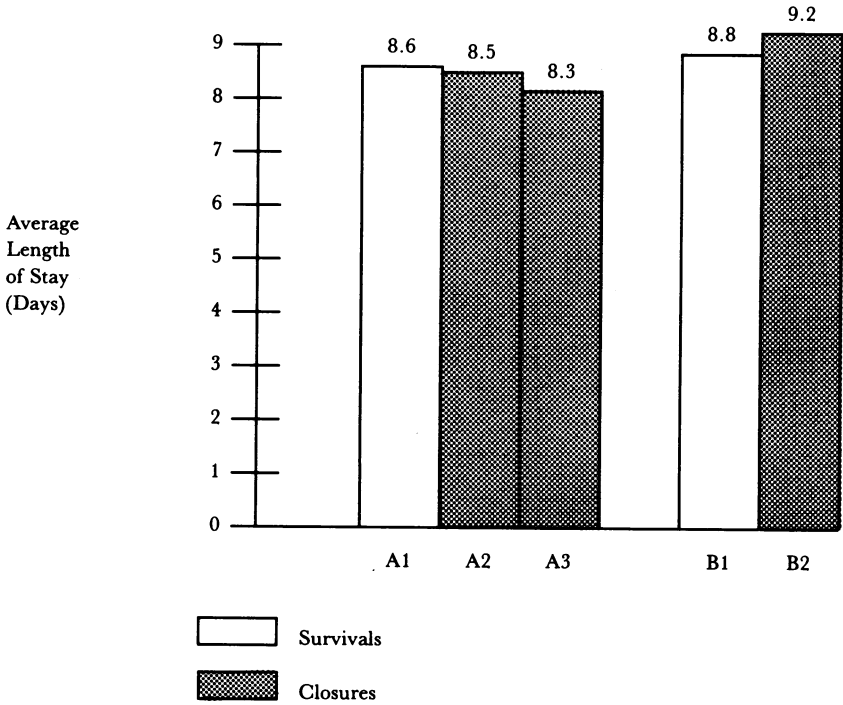


- A: 284 hospitals in 1960: 1960 occupancy rates for all
  - A1: 234 hospitals surviving from 1960 to 1980
  - A2: 20 hospitals closing during 1960-70
  - A3: 30 hospitals closing during 1970-80
  
- B: 259 hospitals in 1970: 1970 occupancy rates for all
  - B1: 234 hospitals surviving from 1970 to 1980
  - B2: 25 hospitals closing during 1970-80

**SIZE**

Hospital size, as measured by number of beds, does show a relationship to closure (Figure 7). Larger hospitals are more likely to survive than smaller ones. The average size of hospitals in 1960 that survived to 1980 was 201 beds. Those existing in 1960 that did not survive to 1970 were markedly smaller, with an average bed size of only 84. The hospitals that existed in 1960, survived to 1970, but succumbed by 1980, averaged 165 beds in 1960, significantly fewer than the 201 beds of the hospitals that survived. Of the set of hospitals open in 1970, the average 1970 size of those that survived to 1980 was 237 beds. Those that closed were much smaller (155 beds). Aside

Figure 5: Length of Stay

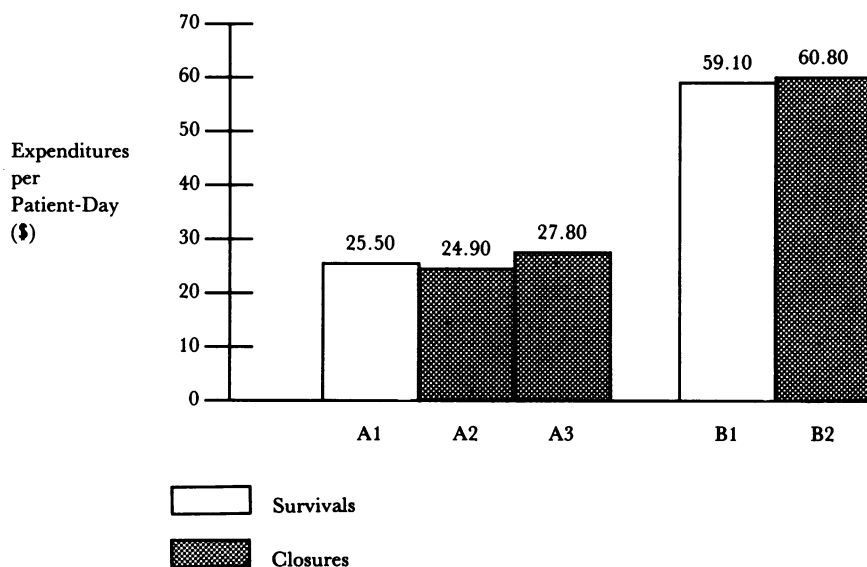


- A: 279 hospitals in 1960: 1960 length of stay for all
  - A1: 232 hospitals surviving from 1960 to 1980
  - A2: 20 hospitals closing during 1960-70
  - A3: 29 hospitals closing during 1970-80
  
- B: 258 hospitals in 1970: 1970 length of stay for all
  - B1: 233 hospitals surviving from 1970 to 1980
  - B2: 25 hospitals closing during 1970-80

from the finding that hospitals which survive are considerably larger than hospitals which close, the data also suggest that, if there is a minimum size for survival, that size has increased; in fact, it has practically doubled. The data were found to be significant at  $P < .05$ . It is possible, however, that the smaller hospitals remaining open at the beginning of each decade are more vulnerable than the larger ones.

Analysis by size shows that the smaller the hospital, the greater the likelihood of closure. As shown in Table 3, 55 percent of the hospitals that had fewer than 50 beds were closed by 1980. In sharp contrast, hospitals with 300 beds or more had a closure rate of only 4 percent. The difference

Figure 6: Expenditures per Patient-Day



A: 258 hospitals in 1960: 1960 expenditures for all  
 A1: 219 hospitals surviving from 1960 to 1980  
 A2: 19 hospitals closing during 1960-70  
 A3: 20 hospitals closing during 1970-80

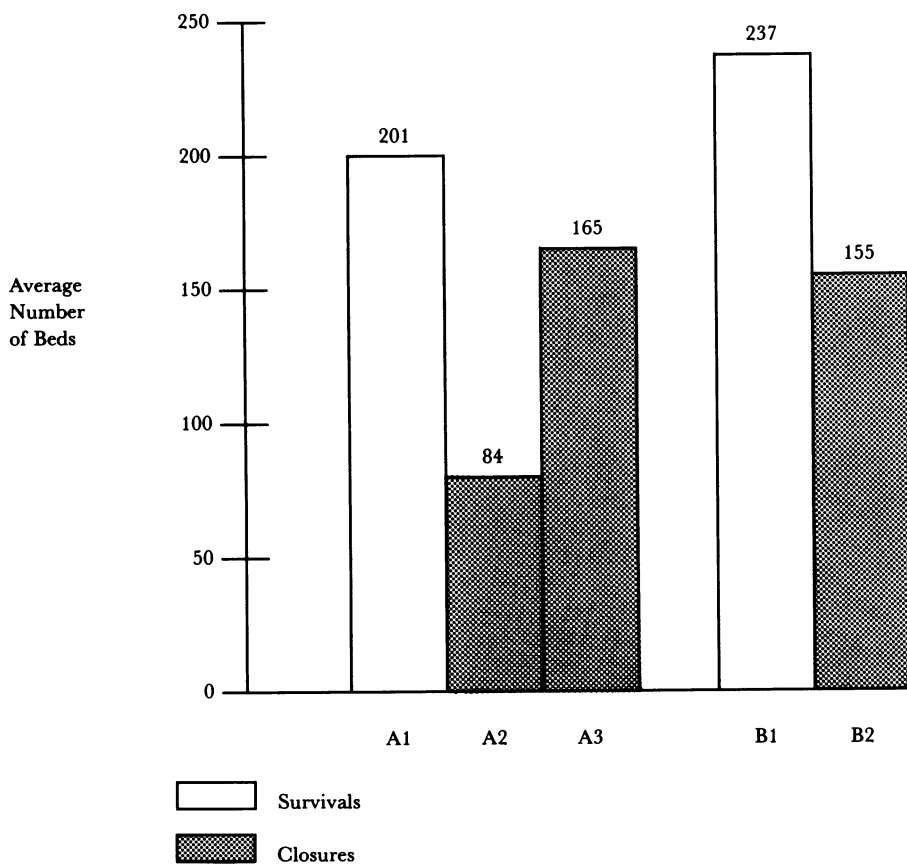
B: 232 hospitals in 1970: 1970 expenditures for all  
 B1: 207 hospitals surviving from 1970 to 1980  
 B2: 25 hospitals closing during 1970-80

between actual and expected closures (“expected” assuming similar closure experience across all sizes) is statistically significant at  $P < .05$ .

#### VARIATION AMONG STATES

Table 4 shows the four operating variables (number of beds, occupancy rate, length of stay, expenditures per patient-day) for each state (Arizona, Pennsylvania, and Maryland) at three times (1960, 1970, and 1980). For the two variables found to be significantly related to closures in the aggregate analysis (size and occupancy rate), Maryland was well above the other two states in terms of size for all three periods. In terms of occupancy rate, Maryland was just above Pennsylvania in 1960 and well above by 1980, and Maryland was well above Arizona throughout. (Indeed, Maryland was 20 percent higher in occupancy than Arizona in 1980.) In length of stay, Maryland and Pennsylvania were very close in all three periods,

Figure 7: Size



- A: 318 hospitals in 1960: 1960 size for all
  - A1: 234 hospitals surviving from 1960 to 1980 (average 201 beds)
  - A2: 23 hospitals closing during 1960-70 (average 84 beds)
  - A3: 31 hospitals closing during 1970-80 (average 165 beds)
  
- B: 273 hospitals in 1970: 1970 size for all
  - B1: 242 hospitals surviving from 1970 to 1980 (average 237 beds)
  - B2: 31 hospitals closing during 1970-80 (average 155 beds)

while Arizona was below each. Although shorter length of stay has been considered a positive indicator, length of stay was shown to be not significant in the analysis of the aggregate sample, and it is not significant by state.

The three states became quite different in expenditures per patient



Table 3: Hospitals and Closures by Size\*

Size Category (No. of Beds)	Hospitals in 1960 (No.)	Closures 1960-80		
		Number	Percent of Category	Percent of Total
< 50	40	22	55	42
50-99	64	12	19	23
100-299	120	17	14	32
300+	47	2	4	4
Total	271	53	—	20

\*Sixty-five percent of all closures were accounted for by hospitals with 99 beds or less and 96 percent by hospitals with 299 beds or less.

Table 4: Size and Operating Characteristics in Three States in 1960, 1970, and 1980

State	Year		
	1960	1970	1980
<i>Number of Beds (Number of Hospitals)</i>			
Arizona	89 (43)	113 (55)	146 (57)
Maryland	239 (38)	265 (44)	275 (50)
Pennsylvania	196 (227)	244 (208)	244 (208)
<i>Occupancy (%)</i>			
Arizona	65.8	62.6	60.8
Maryland	76.5	79.9	80.9
Pennsylvania	74.1	76.9	75.5
<i>Average Length of Stay (Days)</i>			
Arizona	7.4	7.7	6.5
Maryland	8.4	8.7	8.6
Pennsylvania	8.8	8.7	8.4
<i>Expenses (\$) per Patient-Day (Percent Change in Decade)</i>			
Arizona	25.80 (498)	154.20 (61)	248.60
Maryland	28.70 (154)	72.90 (203)	220.60
Pennsylvania	24.90 (120)	54.80 (251)	192.40

day (Table 4) after 1960 (when they were all near \$25). By 1970, Arizona was spending about six times more than it had been in 1960, while Pennsylvania's rate had doubled. The 1960-70 rate rise in Maryland was somewhat larger than the rate rise in Pennsylvania. From 1970 to 1980, the rate of increase was lowest in Arizona, but the level by 1980 was

**Table 5: Hospitals and Closures by State**

<i>State</i>	<i>Hospitals, 1960</i>		<i>Closings 1960-1970</i>		
	<i>Number</i>	<i>Percent of Sample</i>	<i>Number</i>	<i>Percent of Closings</i>	<i>Percent of All Hospitals</i>
Arizona	43	13.9	4	19.0	9.3
Maryland	39	12.6	1	4.8	2.6
Pennsylvania	227	73.5	16	76.2	7.0
Total	309	100.0	21	100.0	6.8

<i>State</i>	<i>Hospitals, 1970</i>		<i>Closings 1970-1980</i>		
	<i>Number</i>	<i>Percent of Sample</i>	<i>Number</i>	<i>Percent of Closings</i>	<i>Percent of All Hospitals</i>
Arizona	55	17.1	10	31.3	18.2
Maryland	44	13.6	0	0	0
Pennsylvania	225	69.4	22	68.7	9.8
Total	324	100.0	32	100.0	9.9

nonetheless well above the other two states, at \$248.60. Although Pennsylvania had the highest increase from 1970 to 1980 (251 percent), by 1980 it was at a level well below that of the other two states. While Arizona also had the highest closure rate, Maryland, not Pennsylvania, had the lowest. Hence there is no clear connection between expenditures and closure rates, either in magnitude or in growth rates. (Arizona's rapid growth in expenditures is most likely due to its preponderance of small and new hospitals; its high closure rate is probably due to the typical combination of small hospitals and low occupancy rates.)

The closure patterns themselves in the three states provided no surprises. As shown in Table 5, Maryland, the state with the largest average hospital size and the highest occupancy rate, experienced well under its share of hospital closures (one out of 39 in 1960-70 and none out of 44 in 1970-80). Arizona, whose hospitals were small in size and low in occupancy rate, had a closure rate much higher than would be expected from its share of hospitals in the sample (four closures out of 43 hospitals, 1960-70; ten out of 55, 1970-80). Pennsylvania, falling between Maryland and Arizona in average size and occupancy, had a share of closures in both periods that was practically the same as its share of hospitals. Thus, the data by state are consistent with the findings of the aggregate sample.

Given the differences in the states' regulatory approaches, the data tend to support the original hypothesis that the presence or absence of rate setting has some effect on patterns of closure and growth rates of expenditures. However, it is important to note that Maryland (the state with the lowest closure rate), had had a low closure rate before and after regulation. This is a further indication that factors other than regulation are at work. Multivariate analysis in the research now under way in 12 states with different regulatory arrangements will allow comparisons over time as well as examination of within-state and between-state variation; it will also show the relative contribution of each variable. Further, the fact that there may be variation in cost containment regulation within a state, as there is in Pennsylvania, will be taken into account.

## CONCLUSIONS

Of the five variables considered, only two (size and occupancy) showed some relationship with the likelihood of closure or survival. The other three (ownership, length of stay, expenditures per patient-day) did not. This was true both on the aggregate level and within states, over two decades. The three states examined were chosen as representative of the heterogeneous population trends and regulatory mechanisms found nationwide; in that way the results could be generalized. However, as indicated in Table 6, all three states are under-represented in number of publicly owned hospitals, and Maryland and Pennsylvania are under-represented in number of proprietary hospitals. Hence, generalizations must be made carefully. That occupancy rates in Maryland and Pennsylvania are higher than the national average is most likely related to the larger average hospital size in these states; regional factors may be involved as well. Arizona falls below the national norm in average hospital size and occupancy rate.

Model 3 is a proposed agenda for future inquiry in this area; and the Appendix presents four propositions for testing the model. Proposition 1 suggests a sequence of strategies for avoiding closure, while Propositions 2 through 4 relate structure, ownership, competition, and regulation to closure and strategies for avoiding closure.

Occupancy should be studied further to determine whether there is some threshold range of occupancy rates below which survival becomes much less likely, or if there is a recognizable trend that would indicate problematic survival. A similar analysis for hospital size is also merited. Expenditures, while not significantly related to closures as analyzed in this article, might show some relationship if examined in stages as closure

**Table 6: Size, Occupancy, and Ownership Characteristics of Arizona, Maryland, Pennsylvania, and All U.S. Hospitals, 1979\***

Characteristic	State			Total U.S.
	Arizona	Maryland	Pennsylvania	
	<i>Occupancy</i>			
Beds occupied (%)	72.9	82.5	79.1	75.9
	<i>Ownership</i>			
<i>Not-for-profit</i>				
<i>Beds</i>				
Number	6,804.0	11,327.0	53,203.0	689,711.0
Percent	76.0	79.0	95.0	70.0
<i>Hospitals</i>				
Number	43.0	44.0	219.0	3,330.0
Percent	72.0	83.0	89.0	57.0
<i>Investor-owned</i>				
<i>Beds</i>				
Number	602.0	813.0	1,600.0	83,338.0
Percent	7.0	6.0	3.0	8.0
<i>Hospitals</i>				
Number	7.0	4.0	16.0	727.0
Percent	12.0	7.0	6.0	12.0
<i>Public†</i>				
<i>Beds</i>				
Number	1,531.0	2,082.0	1,288.0	210,645.0
Percent	17.0	15.0	2.0	21.0
<i>Hospitals</i>				
Number	10.0	5.0	10.0	1,785.0
Percent	16.0	9.0	4.0	30.0
<i>Total (community)</i>				
Beds	8,938.0	14,222.0	56,091.0	983,694.0
Hospitals	60.0	50.0	245.0	5,842.0
	<i>Size</i>			
Average hospital. (number of beds)	149.0	268.0	228.0	168.0

Source: Hospital Statistics, 1980 AHA

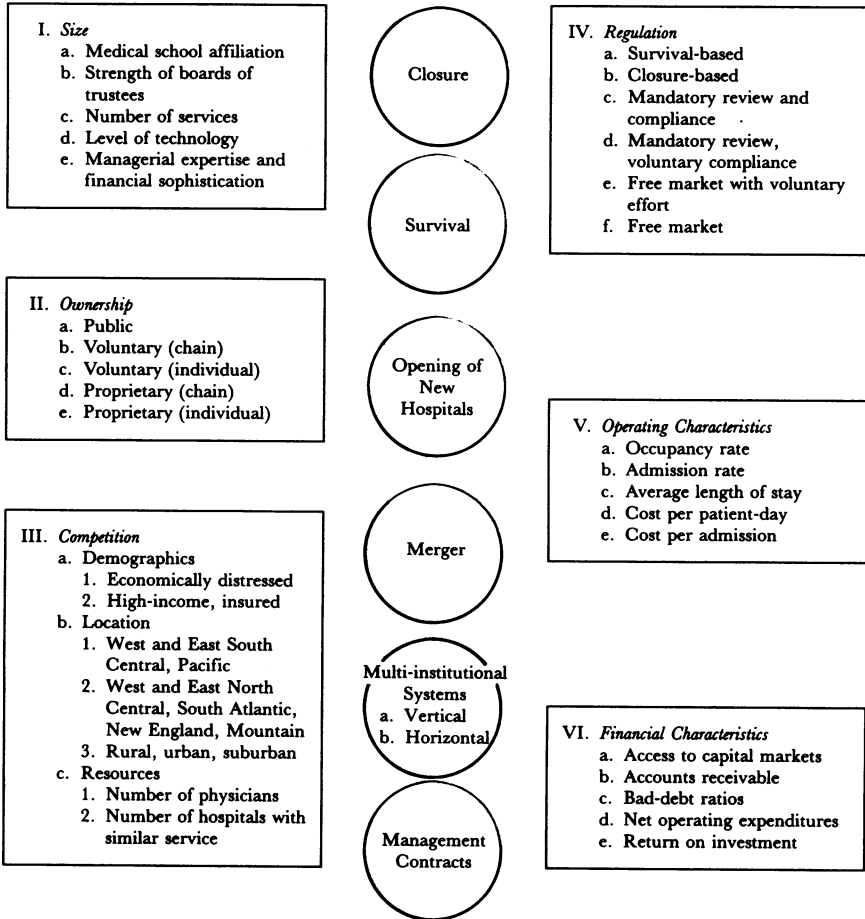
\*Nonfederal acute care hospitals.

†State and local.

drew closer and closer. It is unlikely that ownership would show any relationship to closure if analyzed in this way.

An important question with regard to ownership is the extent to which individual hospitals (both voluntary and proprietary) are being incorporated into multi-institutional systems. The ability of such systems to insulate individual hospitals from market forces should be examined.

**Model 3**



In addition, allegations that these systems tend to restrict unprofitable services, even when the services fill important community needs, should be investigated. Such research would follow the involvement of open and closed hospitals with multi-institutional systems over the past decade.

Government regulation in the form of general hospital rate setting may affect rates of closure. Although Maryland now has the most stringent rate review program, its closure rates both before and after 1970 are low. Arizona had more closings between 1970 and 1980 than in the previous decade; however, it also has more proprietary hospitals and more small hospitals, which may account for the higher rate. Clearly, however,

some programs appear to guarantee survival, while others do not discourage closure.

It may well be that neither the market nor the regulatory system works to reduce hospital capacity for the purpose of lowering health care costs. It appears likely that, if regulatory agencies or market forces are strengthened to encourage closure, the result will be to exacerbate the already disproportionate burden on smaller community hospitals and the less privileged populations they are more likely to serve.

## ACKNOWLEDGMENTS

The authors wish to thank Geoffrey Gibson, Matthew Drennan, Alan Sager, and the anonymous reviewers for their comments and suggestions on earlier drafts of this article.

## REFERENCES

1. Thurow, L. *The Zero-Sum Society*. New York: Basic Books, 1980.
2. Cannedy, L. L., et al. Viability and hospital failure: methodological considerations and empirical evidence. *Health Services Research* 8:27, 1973.
3. Cleverley, W. O., and K. Nilsen. Assessing financial position with 29 key ratios. *Hospital Financial Management* 34(1):30, January 1980.
4. Cleverley, W. O. Financial ratios: summary indicators for management decision-making. *Hospital and Health Services Administration* 26(Special I):26, 1981.
5. Shonick, W. The public hospital and its local ecology in the United States. Some relationships between the plight of public hospitals and the plight of cities. *International Journal of Health Services* 9(3), 1979.
6. Enthoven, A. Consumer choice health plan. *New England Journal of Medicine* (298), March 23 and March 30, 1978.
7. McClure, Walter. *Conversion and Other Policy Options to Reduce Excess Capacity*. Excelsior, MI: Interstudy, DHEW Publication No. (HRA) 79-104044, September 1979.
8. Ruchlin, H.S., et al. Hospitals that fail are often the small ones. *Modern Hospitals* 120(6):61, June 1973.
9. McClure, Walter. On broadening the definition of and removing regulatory barriers to a competitive health care system. *Journal of Health Politics Policy and Law* 3(3), Fall 1978.
10. Mitchell, Samuel. Issues, evidence and the policymakers' dilemma. *Health Affairs* 1:3, Summer 1982.
11. McNeil, D., and R. Williams. Wide range of causes found for hospital closings. *Hospitals* 52(23):76, December 1, 1978.
12. Mullner, R., et al. Closed U.S. community hospitals 1972-78: perspectives and trends. *Social Science and Medicine (Medical Geography)* 14:355, 1980.

13. Mullner, R., et al. Closure among U.S. community hospitals, 1976-80: a description and a predictive model. *Medical Care* 20(7), July 1982.
14. Carauna, R. A., and G. Kudder. Seeing through the figures with ratios. *Hospital Financial Management* 32(6):16, June 1978.
15. Carauna, R. A., and E. T. McHugh. Comparing ratios shows fiscal trends. *Hospital Financial Management* 34(1):12, January 1980.
16. Sager, A. Urban hospital closings in the face of racial change. *Health Care Law Project Library Bulletin* 5:169, June 1980.
17. Sager, A. Is urban voluntary hospital closure an appropriate and effective response to over-bedding? (Unpublished paper) 1981.
18. Ermann, D., and R. Aronoff. A study of central hospital changes. *Medical Care* 18:745, 1980.
19. Pleines, K. M., and H. Williams. Planning with the community in mind can prevent hospital closings. *Hospitals* 5223:87, December 1, 1978.
20. Blendon, R. J., et al. An era of stress for health institutions. *Journal of the American Medical Association* 245:1843, 1981.
21. Health Care Financing Grants and Contracts Reports. *First Annual Report of the National Hospital Rate Setting Study: A Comparative Review of Nine Prospective Rate Setting Programs*. August 1980.
22. Friedman, E. The end of the line: when a hospital closes. *Hospitals* 52(23):69, December 1, 1978.

### APPENDIX: PROPOSITIONS BASED ON MODEL 3— POTENTIAL ADAPTIVE STRATEGIES FOR HOSPITALS IN THE 1980S

Hospitals at high risk of closure can reduce that risk by adopting one of the following developmental sequences:

- management contract → acquisition by a chain (voluntary or proprietary) managing the facility → diversification through vertically integrated systems
- management contract → acquisition
- merger
- acquisition

#### I. Size

- a. Small hospitals lacking medical school affiliation, with less powerful and committed boards of trustees, limited services, limited levels of technology, and less skilled managerial staffs are at greater risk of closure than are hospitals without these characteristics.

## II. Ownership

- a. Individually owned proprietary and voluntary hospitals will seek to adapt to increased competition through merger, management contract, diversification through vertically integrated systems, acquisition by corporate chains, or membership in multi-institutional systems.
- b. Those voluntary and proprietary hospitals already owned or managed by corporate chains are likely to be at substantially less risk.
- c. Public hospitals are very vulnerable now and are increasingly being acquired directly by chains and being managed under contract or pressured into conversion.

## III. Competition

As marketing and strategic planning become increasingly powerful management tools, stronger hospitals will seek to minimize the effects of competition through

- a. Aggressive recruitment of physician personnel;
- b. Development of vertically integrated systems to ensure continued market dominance through development of comprehensive services;
- c. Exploration of merger potential to limit competition; and
- d. Development of satellite facilities away from economically distressed neighborhoods and near higher income, well-insured populations.

## IV. Regulation

- a. It appears likely that stringent regulation (on the public utility model) will continue in parts of the East and in the Central states; competition, either free market or voluntary compliance, will likely persist as the model for the remaining states.
- b. The highly regulated states will continue carefully to monitor hospitals on both operating and financial behavior, possibly leading to some increases in closures (unless explicitly discouraged), mergers, and multi-institutional system activity, but with pressure away from formation of new hospitals.
- c. Nonregulated states are potentially more volatile in terms of closings and openings and are more likely to see an increase in corporate chains. These chains are better able to maintain less efficient facilities (at least in the short run), since risk can be spread across the entire system.