

**NONCONTRACTIBLE QUALITY AND ORGANIZATION FORM
IN THE U.S. HOSPITAL INDUSTRY**

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ABSTRACT

Despite the widespread attention paid to the determinants of equilibrium ownership structures and organizational form in private, for-profit firms, much less attention has been paid to equilibrium choices of not-for-profit versus for-profit status. We examine this choice for firms in the hospital industry in the United States. The hospital industry conforms well to recent theoretical advances stressing the importance of contractual failure in explaining organizational form. In addition, the frequency of conversions among private-for-profit, private-not-for-profit, and government organizational status allows us to examine empirically the key predictions of these theories and compare those predictions to explanations based on altruistic or tax-related explanations of ownership status.

Our principal findings are four. First, among not-for-profit hospitals, government hospitals have higher relative input use, serve less-well-off markets, and have more bed-days represented by Medicaid patients. Second, consistent with a role for noncontractible quality, not-for-profit hospitals with a relatively high share of revenues devoted to wages are less likely to convert to for-profit status; for-profits tend to acquire not-for-profits in markets in which households have relatively low levels of educational attainment or income. Third, consistent with the noncontractible quality explanation, not-for-profits are more likely to shed not-for-profit status when there is no other government or not-for-profit hospital in the same market. Fourth, other transitions are also broadly consistent with the movement toward an equilibrium distribution of ownership status with variation explained in part by proxies for variation in preferences for noncontractible quality.

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I. INTRODUCTION

The hospital sector in the United States has a uniquely divergent set of organizational forms. Large numbers of for-profit, private not-for-profit, and government hospitals comfortably coexist. At the same time, conversions among the three forms of organization are increasingly common. The effects of the different organizational forms on the delivery of key health services to patients in affected regions are not well understood. While some studies suggest that the impact of organizational form on patient outcomes is measurable (Hawes and Phillips, 1986; Weisbrod, 1988, 1994), a fully satisfactory answer can not be reached until one better understands why the three separate organizational forms coexist and what motivates changes among them.

The motivations of for-profit firms are uncontroversial: They are (presumably) seeking to maximize profits for their shareholders. There is much less agreement concerning the motivations of those who organize not-for-profit hospitals. Existing theories can be organized loosely into four groups: (1) theories based on patient preferences; (2) theories based on doctor preferences; (3) theories based on altruism of not-for-profit organizers; (4) theories based on tax or other financial concerns. Each research program has informed our knowledge of the activities of nonprofits, and has reasonably abundant anecdotal support. There is very little empirical evidence, however, which could be used as a guide to the relative importance of the competing theories. This lack of evidence is important. Clearly, any conclusions concerning the likely effects of trends away from not-for-profit status must be suspended until such evidence is

available.¹

In this paper, we identify key differences between the proposed explanations for choice of organizational form, and develop tests of the empirical importance of the alternative theories based on these differences. The next section lays out the various theories and identifies our four key tests. Section III describes the data we use to perform our tests. We then turn to the empirical evidence in section IV; section V concludes.

II. WHY ORGANIZE AS A NOT-FOR-PROFIT HOSPITAL?

There have been many attempts to provide theoretical justification for the observed wide diversity of organizational form in the hospital sector. Some analysis stresses the decision to trade off tax advantages of not-for-profit status (exemptions from income and property taxes and ability to issue tax-free debt) with low costs or raising additional capital through public equity markets (see, *e.g.*, Weisbrod, 1988; Gentry and Penrod, 2000; and Lakdawalla and Philipson, 1998).

Another possibility is that not-for-profit hospitals exist because of altruistic motives of some entrepreneurs to use a surplus to care for the poor or finance research (see, *e.g.*, the review

¹ Many commentators, for example, have voiced concerns about whether hospital conversions from not-for-profit to for-profit status portend a decline in the quality of care (though, outside of teaching hospitals, there is little evidence of significant differences in observable measures of quality of care (see Sloan, Piccone, Taylor, and Chou, 1998)). While this concern has surfaced through allegations of misconduct against some for-profit hospitals (*e.g.*, the charges of excessive Medicare billing leveled against Columbia/HCA), representatives of the medical profession have also volunteered reservations about the impact of hospital conversions on the quality of care (see the review in Hyman, 1998). Finally, policymakers have often argued that the justification of a tax exemption for not-for-profit hospitals is to provide funds for community service. In this context, there is concern that shifts from not-for-profit to for-profit status could portend declines in uncompensated care, as suggested by Barro (1998) (though Zeckhauser, Patel, and Needleman (1995) dispute this link in general).

in Rose-Ackerman, 1996).² Our emphasis, below, on surplus-maximizing “entrepreneurs” in not-for-profit firms and for-profit firms does not deny the role for altruistic behavior in the former. In addition, altruism arguments which center on public good provision of indigent care or research may be appropriate in explaining public financing of government hospitals or academic health centers.³ For-profit hospitals would not provide, or certainly would underprovide these public goods.⁴ Again, while one observes that not-for-profit hospitals provide both research and indigent care, their motives in doing so are not clearly understood.

In the context of hospitals, an emphasis on noncontractible quality from the perspective of patients (in the sense of Hansmann, 1980) has also been explored. Patients and health care providers may have asymmetric information about the quality of care, and not-for-profit status can signal an interest in quality over profits (as in Easley and O’Hara, 1983; and Hansmann, 1996). Alternatively, a desire for high noncontractible quality by consumers can lead hospitals to commit to soft incentives by choosing a not-for-profit status (as in Glaeser and Shleifer, 1998).

We emphasize in this paper the uniqueness of the predictions of the “contractual failure” explanation of not-for-profit hospitals (following most closely the framework of Glaeser and Shleifer, 1998). Strong incentives in the hospital health care setting can lead to *ex post* appropriation of a surplus designed *ex ante* to support “quality,” behavior which cannot be well

² Altruism, even if an important motive, need not justify a local tax exemption for a not-for-profit firm if there are significant spillovers in benefits.

³ Hubbard (1998), for example, analyzes the substitutability of faculty practice plan profits at academic health centers and demands for publicly financed medical research.

⁴ Norton and Staiger (1994) have shown for-profit hospitals to provide equal levels of indigent care as non-profits after controlling for market differences but that for-profits tend to locate where less indigent care is demanded.

controlled by an explicit contract (as in the classic contractual failure case of Alchian and Demsetz, 1972; and Klein, Crawford, and Alchian, 1978).⁵ In particular, strong incentives may lead for-profit entrepreneurs to focus attention on cost reduction, building producer surplus at the expense of lower levels of noncontractible quality for consumers.⁶ As Glaeser and Shleifer (1998) note, this shifts an “asymmetric information” focus from the hospital-patient relationship to the imperfect verifiability of “quality” of patient care by a third-party arbiter (*e.g.* a court of law). In this setting, the choice of not-for-profit status increases incentives to provide non-verifiable quality.

The essence of the entrepreneurial decision about noncontractible quality and ownership status is that of choosing ownership status to commit (or not) to soft incentives.⁷ Following Glaeser and Shleifer (1998), the firm (here a hospital) sells a good in a market at a price P and verifiable quality Q_I . After the sale, the firm can choose whether to expend effort E to make an innovation reducing costs by $K(E)$, (where $K'(E) > 0$ and $K''(E) < 0$). If $C(Q_I)$ is the cost of simply producing a good of verifiable quality Q_I , total production costs after the innovation are given by $C(Q_I) - K(E)$. However, innovation leads to a key wedge between contractible or verifiable quality and noncontractible or nonverifiable quality from the consumer’s perspective. The innovation reduces nonverifiable quality by mE (where m is a constant), though verifiable

⁵ Hart and Moore (1998) review the key conceptual issues in the incomplete contracts literature.

⁶ Starr (1982), for example, argues that the virtual absence of for-profit hospitals prior to 1870 can be attributed to mistrust of motives of for-profit hospitals.

⁷ Our focus on maximizing behavior by not-for-profit entrepreneurs is not inconsistent with institutional descriptions of hospital management (see, *e.g.*, Stevens, 1989; and Brody, 1996).

quality is still Q_i .⁸

Formally, we consider the decision of a single entrepreneur or residual claimant operating the hospital. One may think of this entrepreneur as a “physicians’ cooperative” in the spirit of Pauly and Redisch (1973).⁹ Indeed, in many respects, the “physicians’ cooperative” explanation of Pauly and Redisch is a complement to the “noncontractible quality for the patient” explanation that we exploit. In the cooperative setting, physicians act to maximize their net income. When not all actions of the physicians can be perfectly monitored and contracted upon, the physicians become residual claimants in the sense of Alchian and Demsetz (1972). The choice of not-for-profit status helps insure that the hospital surplus will be invested in capital and nonphysician labor to support physician incomes. The story we emphasize adds to this contractual failure the idea that patients’ preferences for noncontractible quality can also affect hospital input choices and organizational form.

If E denotes consumers’ anticipation of the level of unverifiable effort, willingness to pay is given by $q+Q_i-mE$, where we assume that q is a constant in the market. In the short run, the

⁸ Consider the following example. A patient chooses a hospital for a procedure with a cost P and level of verifiable quality Q . At issue is the level of noncontractible quality *ex post*. The consumer/patient could pay a high price for the hospital stay expecting additional quality in terms of staffing and timeliness of attention; the hospital could renege on this dimension of quality after receiving the price P without renegeing on the verifiable quality of the procedure. Consumers/patients may believe that the not-for-profit hospital has less of an incentive to consume the *ex post* surplus by not providing extra or better staff. This story is distinct from one in which patients simply have asymmetric information about physicians’ efforts and greater physician surplus encourages the physicians to increase the level of verifiable quality of care.

Nursing services may also provide an element of noncontractible quality. Registered nurses, for example, represent 23 percent of the workforce in U.S. hospitals and represent hospitals’ largest single labor cost (American Hospital Association, 1996-1997). Links between staffing and morbidity and post-operative infections, respectively, have been examined by Krakauer, *et al.* (1992) and Kovner and Gergen (1998), with the general conclusion that nurse staffing is negatively related to adverse events.

⁹ Pauly and Redisch characterize the short-run and long-run industry equilibrium in a “physicians’ cooperative” income maximization problem. Earlier work by Newhouse (1970) and Feldstein (1971) characterizes the solution to maximizing quality or quantity subject to a budget constraint.

entrepreneur chooses Q and E . The maximization problem compares outcomes under different ownership status assumptions. That is, for a for-profit organization, the entrepreneur is the residual claimant on $P - C(Q_1) + K(E)$; effort is chosen to maximize $P - C(Q_1) + K(E) - E$, so that optimal effort level E_{fp} solves $K'(E) = 1$. The not-for-profit entrepreneur faces a zero-explicit-profit-constraint and obtains income and perquisites. That is, the not-for-profit entrepreneur's "residual claimant" valuation is given by $d(P - C(Q_1) + K(E)) - E$, where $d < 1$ represents the discount applied to perquisite consumption relative to cash.¹⁰ In this case, optimal effort, E_{np} , solves $dK'(E) = 1$. Because $K(E)$ is concave by assumption, $E_{np} < E_{fp}$.

This observation in the Glaeser and Shleifer setting captures an essential entrepreneurial choice of for-profit versus not-for-profit status. That is, cost-reducing effort in the for-profit firm exceeds that in the not-for-profit firm, all else being equal. The resulting higher price for the "good" produced by the not-for-profit firm reflects the valuation by consumers of noncontractible quality. This result is predicated on the assumption that the commitment to higher quality by a not-for-profit firm is not undermined by diverting the gains to the entrepreneur directly in an *ex post* conversion to for-profit status. For hospitals, this requirement is consistent with the regulations which govern non-profit entities.

If there were no heterogeneity within a market in producer costs or consumer preferences for quality, producers would choose their status according to the level of consumer taste for noncontractible quality. For a sufficiently high level of consumer taste for noncontractible quality, all entrepreneurs would organize not-for-profit firms; for a sufficiently low level of consumer taste for noncontractible quality, all entrepreneurs would organize as for-profit firms.

¹⁰ That is, we assume that the "no private inurement" constraint for not-for-profit hospitals is binding.

In addition to describing this determination of equilibrium ownership status, the Glaeser-Shleifer setup links profitability and ownership status. In particular, increases in profitability raise the value of cash relative to perquisites, increasing the desirability of the for-profit organizational form.

For hospitals, of course, it is unreasonable to assume that ownership status varies only cross-sectionally among geographic markets. Many regions contain both for-profit and not-for-profit (both private and government) hospitals. Within a noncontractible quality framework, heterogeneity within a market on two dimensions can account for variation in ownership status (see also the discussion in Pauly, 1987). First, consumer tastes for noncontractible quality may vary within as well as across markets. Within a broadly defined market, submarkets in which consumers with a high taste for noncontractible quality are relatively more important are more likely to be supported by not-for-profit hospitals. Second, hospitals within a market may have different costs. Holding consumer preferences for noncontractible quality constant, lower-cost hospitals should be more likely to choose a for-profit ownership status, while higher-cost hospitals should be more likely to choose a not-for-profit status.

In what follows, we incorporate a feature of the hospital industry to the noncontractible quality framework---the existence of government hospitals among “not-for-profit” hospitals. The examples from Glaeser and Shleifer, reproduced above, presume that the commitment to a higher level of noncontractible quality leads to a higher willingness to pay and a higher “price” paid by quality-sensitive consumers (*cf.* the analysis by Philipson, 1997 of substitutability between outputs of for-profit and not-for-profit nursing homes). To the extent that care for the indigent is unavailable in the geographic market (because of the absence of a publicly supported hospital),

the higher commitment to quality may draw indigent patients as well as paying patients, reducing the surplus available to fund soft incentives (see also the discussion in Duggan, 1998). All other things equal, then, the desirability of the not-for-profit organizational form as a quality commitment mechanism for a hospital is greater when publicly supported institutions with a responsibility for indigent care are present in the market.

The noncontractible quality approach to not-for-profit entrepreneurship therefore yields four significant testable predictions about hospital ownership status. First, proxies for higher levels of noncontractible quality (*e.g.*, wages paid to professional employees) should be positively associated with not-for-profit ownership status (see, *e.g.*, Holtmann and Idson, 1993).¹¹ Second, in the determination of equilibrium ownership status, empirical proxies for significant consumer taste for noncontractible quality (*e.g.*, proportion of high-income and high-education consumers in the relevant market) should be positively associated with not-for-profit status. Third, within-market decreases in profitability (measured, *e.g.*, by increases in competition) should be positively associated with not-for-profit ownership status. Fourth, not-for-profits should be more likely to be present in a region that is already served by a government hospital, which presumably can specialize in providing care to the indigent that have a relatively low demand for noncontractible quality.

We focus in this paper in developing and testing the noncontractible quality theory. The alternative theories at times align with these predictions, but at other times they do not. For example, under the altruism hypothesis, quality-signaling variables should not be important

¹¹ This prediction contrasts sharply with the view that not-for-profits, undisciplined by market forces, are so inefficient because of excessive input payments operations. Under this “market discipline” view, very inefficient not-for-profits should be the targets of conversions; noncontractible quality theory suggests the reverse.

predictors of ownership status; private not-for-profits would emerge in low-profitability markets in which fewer or no government hospitals are present (as alternative care providers for the poor); and changes in ownership status should be explained by financial distress. In general, tests of a “financial distress” explanation for conversion are somewhat difficult. In principle, the shock to the not-for-profit firm is an exogenous decline in the “surplus” which is used to fund altruistic activities. Observations of accounting measures of “net income” are not particularly helpful as they net the contribution of surplus (from services or patients with a markup over incremental cost) and the cost of funding altruistic activities (*e.g.*, indigent care).¹²

The physicians’ preference hypothesis shares with the patient’s preference hypothesis a link between profitability and a change in ownership status. However, unlike the patients’ preference hypothesis, proxies for patient preferences for noncontractible quality should not predict ownership status. The tax hypothesis would allow no role for patient quality preferences in predicting ownership status, which instead is determined by the tradeoff between tax advantages¹³ of not-for-profit status and the benefits of access to public equity markets, and would be difficult to reconcile with coexistence within markets of for-profit and not-for-profit hospitals.

After describing our micro data on U.S. hospitals and markets in the next section, we conduct two types of empirical tests. We begin with cross-sectional analysis of the determinants

¹² One possibility is to identify factors associated with declines in surplus – such as increases in HMO penetration, which we describe later.

¹³ For example, Gulley and Santerre (1993) focus on cross-sectional variation in corporate income and local property tax rates in explaining not-for-profit hospital market share, finding that higher corporate income and local property tax rates result in a larger not-for-profit hospital market share.

of ownership status (assuming that hospitals have achieved their equilibrium ownership status). Second, realizing that ownership status for hospitals may have been driven in part by historical accident, we analyze the determinants of conversions among for-profit, private not-for-profit, and government not-for-profit organizational forms. This second set of tests has promise to be more powerful. In the dimension of a relevant variable, the not-for-profits that switch to for-profit status should be those not-for-profits that are closest to the for-profit margin; *i.e.*, those not-for-profits that are farthest from the canonical form of not-for-profit hospital.

III. THE DATA

We perform our analysis of ownership status using data from two sources. Our hospital-level data are taken from Medicare Hospital Cost Reports Forms 2552-85, 2552-89 and 2552-92, which are submitted to the Health Care Financing Administration (HCFA) by general and short-term hospitals in all fifty states and the District of Columbia. These reports are contained in the PPS Minimum Datasets compiled by HCFA. Eleven years of data, from 1985 through 1995, corresponding to datasets PPS II through PPS XII, are available. These datasets contain cost, statistical, and financial data. We merged these data with zip-code level population and demographic statistics taken from the 1990 census. Each observation in the data set is a hospital, and we observe at each point in time the organizational status of that hospital. This status, or the changes in the status serve as the dependent variable in our exercises.¹⁴

The first noncontractible quality hypothesis is that the not-for-profit hospitals will have higher commitments to unobservable quality. Commitments to unobservable quality are likely to

¹⁴ We present data item numbers used in our variable construction in the Data Appendix.

be especially related to commitments concerning labor. A hospital could renege by not providing staff labor expected by a patient, but the building or operating table is not an interesting margin for such behavior, both because the capital is observable and because the capital likely has a relatively low marginal cost of employment. Thus one simple proxy for the level of noncontractible quality is the ratio of total wage bill to total sales for each hospital; we assume that more (or possibly more highly paid) staff serve as a signal to patients that the level of noncontractible quality is high.

The second implication is that not-for-profits should be present where there are many consumers who have a preference for high-noncontractible-quality medical care. We proxy for this taste for quality with two variables: income and education. Our income variables are the proportion of individuals in a region with incomes less than \$20,000 in 1989 and the proportion of individuals in a region with income greater than \$75,000 in 1989. Our education variables are the proportion of residents of a region that have less than a high school education in 1990, and the proportion of residents of a region that have a college education or more in 1990..

The third implication is that increases in profitability within a region would decrease the probability of finding not-for-profit hospitals operating there. As a measure of the profitability of a particular hospital, we calculate the percentage of total sales in a given region accounted for by that hospital.¹⁵

The final implication is that the use of not-for-profit status as a commitment to quality is more likely in markets in which there is another hospital present that will provide care for the

¹⁵ This market share variable only weakly captures the potential presence of market power. We later explore consequences of changes in HMO penetration in the market as a proxy for shifts in profitability (see, *e.g.*, Baker and Corts, 1995; Barro, 1998; and Hubbard, 1998).

indigent. As a proxy for this channel, we construct a dummy variable that is equal to zero if a not-for-profit is the only such hospital in a market, and equal to unity if there are other government or not-for-profit hospitals in that region.

In order to control for other factors, and explore implications of the other theories, we also include year dummies, the debt-to-asset ratio for each hospital, Medicare and Medicaid days as a percent of total days, the ratio of total fixed capital to revenues, number of hospital beds, average length of stay per case, number of residents, the hospital occupancy rate, and the hospital case-mix index (a measure of the average costliness of cases treated in a hospital).¹⁶

IV. EMPIRICAL ANALYSIS OF OWNERSHIP STATUS AND CONVERSION

We begin by providing some summary statistics concerning the hospitals in our sample and their location. Figure 1 provides information on the relative intensity of not-for-profit hospital status across U.S. states. While much of the public policy concern has focused on hospital conversions, the vast majority of hospitals have not changed organizational form. Indeed, this stability precedes our data (see, *e.g.*, the analysis back to 1975 in Hyman, 1998). The top panel of Figure 1 describes the percentage of hospitals that were not-for-profit for each state in 1985. Darker-shaded states have a high percentage of not-for-profits, whereas lighter-shaded states have a relatively low percentage of not-for-profits. The highest concentration of not-for-profits is in the Northeast, with the lowest concentration in the South and Mountain region. The bottom panel provides the same perspective, but this time for 1995. The picture looks remarkably similar, with some reduction in not-for-profits in the Northeast and North Central regions, and a

¹⁶Although not reported, estimates including Census region dummies are qualitatively similar.

concomitant reduction in the southern states.

Figure 2 provides two panels that track the proportion of government hospitals in each state. The top panel shows the data for 1985. Government hospitals are very rare in the Northeast, and relatively common in Texas and the Southwest. The bottom panel indicates that the share of government hospitals in total appear to have increased in many states, especially in the South.

Figure 3 provides a perspective on the evolution of the share of for-profit hospitals in each state. In 1985, for-profit hospitals were especially common in the South, the West, and the Midwest. By 1995, the share of for-profit hospitals declined in the Northeast, but stayed fairly constant elsewhere.

Because our analytical approach suggests that the analysis of conversions¹⁷ may yield special insight, Figure 4 provides an indication of the percentage that each state in our sample has of not-for-profit to for-profit conversions. These are most common in the South, the Northeast, and the West.

Table 1 provides some summary statistics from our sample. Over eleven years, we have 17,747 observations of not-for-profit hospitals. We observe 147 switches to for-profit status, and 369 switches to government status. We have 2468 observations on for-profit hospitals, with 179 conversions to not-for-profit status and 203 conversions to government status. Finally, we have 9033 observations of government hospital years, with 424 conversions to not-for-profit, and 52 conversions to for-profit. One interesting lesson is that conversions from not-for-profit to for-

¹⁷ When not-for-profits convert to for-profit status (either directly or through being acquired), the proceeds of a conversion legally must remain in the charitable sector, usually within a community charitable foundation (see, *e.g.*, Cutler and Horwitz, 2000; and Hyman, 1998).

profit status are a small fraction of total conversions (see also the related and corroborating calculations over different time periods in Needleman, *et al.*, 1997; and Hyman, 1998).

We now turn to the empirical analysis. Table 2 presents the results of estimating a “levels” multinomial logit model describing the organizational form of the hospitals in our sample.¹⁸ The dependent variable equals zero if a hospital is not-for-profit, one if the hospital is for-profit, and two if the hospital is government. The top half of the panel contains the estimated coefficients on the determinants of for-profit status, relative to not-for-profit status. For the purpose of these tables we define the market with respect to other hospitals to be the three-digit zip code area. In the first column we construct the population characteristic variables at the broader three-digit market area and in the second column we use the narrower five-digit zip code market area definition.¹⁹ For-profits have about the same capital costs but lower labor costs, relative to revenues, than not-for-profits. For-profits generally have a lower market share than not-for-profits, higher debt relative to assets, and fewer Medicare bed-days as a percentage of total bed-days. For-profits tend not to be located in regions that have other government or not-for-profit hospitals, relative to not-for-profits’ locations. These conclusions tend to be stronger

¹⁸ The models presented in Table 2 and subsequent tables include year dummies, the estimated coefficients of which are not reported.

¹⁹ The question of what constitutes “the market” for a hospital is a tricky one. While we have emphasized zip code measures of the market to facilitate the matching of hospital and demographic data, such measures are, of course, arbitrary. Conventional antitrust methods, for example, emphasize the articulation of boundaries such that both few consumers in the area purchase services outside the area and few consumers outside the area purchase services within the area. Because flows are endogenous (in our case, with respect to valuation in quality), one might use a fixed-radius market measure, though such an approach suffers from the need to defined the radius relatively precisely. Our approach is consistent with an attempt to analyze directly patients’ choice of hospitals based on (arguably) exogenous characteristics of hospitals and patients (see also Kessler and McClellan, 1999).

when we define a region as being the same three-digit zip code.

As the bottom panel of Table 2 shows, determinants of government hospital ownership status look quite different from those of private not-for-profit hospitals. Those hospitals have more capital and more labor relative to revenues than private not-for-profit hospitals, tend to locate where there are more low-income and less-well-educated households, and tend to have more Medicaid bed-days as a fraction of total bed-days.

Table 3 presents estimates of multinomial logit models that track the transitions of not-for-profit entities. The dependent variable is equal to zero if a not-for-profit does not change organizational status in a given period, one if the not-for-profit becomes a for-profit, and two if the not-for-profit becomes a government hospital. The top panel of the table describes the impact of our explanatory variables on the probability of switching to for-profit status. As the noncontractible quality theory predicts, not-for-profit hospitals with a high wage bill are less likely to convert to for-profit status than those hospitals with a relatively low wage bill, all else being equal. Conversions to for-profit status by not-for-profit hospitals tend to occur in markets in which households have relatively low levels of educational attainment and income.²⁰ Also consistent with the theory, not-for-profits are less likely to convert to for-profit status when there is another government or not-for-profit in the same market region. Not-for-profits are less likely to convert if they have a high market share. Debt levels²¹ and Medicare and Medicaid days have

²⁰ Indeed, the acquisition strategy pursued by Quorum in the 1990s focused on hospitals in mid-sized markets with middle-income households (personal communication with Russell Carson, chairman of the board of directors of Quorum, and Green, 1995).

²¹ This result differs from the finding in Barro (1998) that high debt levels are an important predictor of conversion, though the samples and empirical models are different.

little explanatory power for conversions.

The bottom panel describes the impact of our explanatory variables on the probability that a not-for-profit converts to government. Such conversions are likely to occur when a not-for-profit is located in a relatively poor region, with a hospital that has a high proportion of Medicaid days. The not-for-profit hospitals that switch to government organization are those that are less likely to be near another government or not-for-profit hospital, though, again, this effect is not statistically significant. Finally, the not-for-profits that do switch to government hospitals have relatively high ratios of capital and labor to revenue. It is difficult to attribute this last result to quality issues, and it may reflect the fact that many large, unionized, and inefficient not-for-profit hospitals have been taken over by municipalities in order to prevent their closing.

The next two tables present the results for the mirror-image changes: For-profit hospitals converting to government and not-for-profit status, and government hospitals converting to for-profit and not-for-profit status. Generally speaking, these results tell the same story as Table 3. For-profits are likely to switch to not-for-profit status if they have high ratios of inputs to revenues, or if there is another not-for-profit or government hospital present. Government hospital conversion to not-for-profit is positively correlated with labor cost and capital intensity. Government hospitals are more likely to switch to for-profit if other government or not-for-profit hospitals are present in the market.

These results suggest that observed hospital ownership status transitions are consistent with a movement toward an equilibrium distribution in which government hospitals mostly treat the indigent, not-for-profit hospitals mostly treat the well off and highly educated, and for-profit hospitals treat patients who are in between. The development of better “market” and

“competition” proxies²² will permit a more rigorous examination of this evolution of ownership status.

V. CONCLUSIONS AND DIRECTIONS FOR FUTURE RESEARCH

Despite the widespread attention paid to the determinants of equilibrium ownership structures and organizational form in private, for-profit firms, much less attention has been paid to equilibrium choices of not-for-profit versus for-profit status. We examine this choice for firms in the hospital industry in the United States. The hospital industry conforms well to recent theoretical advances stressing the importance of contractual failure in explaining organizational form. In addition, the frequency of conversions among private for-profit, private not-for-profit, and government organizational status allows us to examine empirically the key predictions of these theories and compare those predictions to explanations based on altruistic or tax-related explanations of ownership status.

Our principal findings are four. First, among not-for-profit hospitals, government

²² When we add the “margin” variable in the HCFA Cost Reports to our tests, the estimated effects reported in Tables 2-5 are very similar to those reported here, though the estimated coefficient on “margin” is statistically insignificant. The margin variable is clearly endogenous, so we also experimented with the addition of a proxy for HMO penetration. These data can be matched with the HCFA data over the 1990-1994 period. For this shorter sample, our estimated coefficients on variables of interest (*e.g.*, labor share and income and education proxies) are very similar to those presented here, while the estimated HMO penetration coefficient is generally insignificantly different from zero.

We also experimented with including the margin in our empirical model with HMO penetration as an instrumental variable (using data from the 1990-1994 subperiod for which the HMO penetration data are available). The (instrumented) margin variable had no statistically significant effect on conversions from not-for-profit to for-profit ownership. However, the estimated effect of the (instrumented) margin on conversion from not-for-profit to government is negative and precisely estimated (*i.e.*, a decline in margins owing to an increase in HMO penetration increases the likelihood of conversion from not-for-profit to government ownership).

hospitals have higher relative input use, serve less-well-off markets, and have more bed-days represented by Medicaid patients. Second, consistent with a role for noncontractible quality, not-for-profit hospitals with a relatively high share of revenues devoted to wages are less likely to convert to for-profit status; for-profits tend to acquire not-for-profits in markets in which households have relatively low levels of educational attainment or income. Third, consistent with the noncontractible quality explanation not-for-profits are more likely to shed not-for-profit status when there is no other government or not-for-profit hospital in the same market. Fourth, other transitions are also broadly consistent with the movement toward an equilibrium distribution of ownership status with variation explained in part by proxies for variation in preferences for noncontractible quality.

We have in mind four extensions. First, our characterization of a single “entrepreneur” as a decision maker is obviously a gross simplification. We would like to include distinctions between physician and nonphysician staff and an explicit role for physical capital inputs, while maintaining the noncontractible quality problem. Second, the addition of insurance is an important extension. Increases in the completeness of insurance, all else being equal, should increase consumer demand for noncontractible quality, increasing the desirability of the not-for-profit status. In this respect, we plan to explore whether declines in insurance generosity (or cross-market variation in insurance generosity) are associated with an increase in the likelihood of conversion to for-profit status.

Third, more generally, an extension of this analysis to a study of the links between organizational form and total factor productivity is desirable. If one interprets narrowly the physicians’ cooperative as analogous to “management entrenchment” applied to hospitals, not-

for-profit status may be associated with excessive input use. In this setting, conversion to for-profit status may be associated with significant increases in measured total factor productivity. In the noncontractible quality explanation of organizational form, conversions from not-for-profit status to for-profit status should occur for hospitals for which noncontractible quality is least desired by consumers/patients, implying more modest gains in measured total factor productivity, following a conversion to for-profit status.

Finally, we plan to investigate the implications of our analysis of determinants of organizational form in the hospital industry for the design of tax subsidies for indigent care, graduate medical education, and research. Particularly if variation in organizational form reflects heterogeneity in willingness to pay for noncontractible quality, indirect tax subsidies may be dominated by other, more direct subsidy schemes.

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DATA APPENDIX

We used two datasets were employed for this analysis. The first is the Health Care Financing Administration's PPS Minimum Data Sets II through XII, which correspond to fiscal years 1985 through 1995. This eleven-year panel contains annual observations on every hospital in the United States that received Medicare reimbursement and was operating in 1998. The dataset contains cost, statistical, and financial data from the Medicare Hospital Cost Report Form HCFA-2552-92. We begin by examining non-federal, general short-term hospitals.

The second dataset we use is the Census of Population and Housing, 1990; Summary Tape File 3. This dataset contains demographic data by zip code, which are matched with the HCFA data for each hospital observation. Only hospitals for which Census data are available are used.

The following table describes the construction of the variables that are used in the multinomial logit regressions.

<i>Variable</i>	<i>Description</i>
Capital/Revenue	(Current Assets)/(Patient Revenue - Patient Discounts and Allowances)
Salaries/Revenue	(Direct Salaries)/(Patient Revenue - Patient Discounts and Allowances)
Market share	(Hospital's Own Revenue)/(Hospital's Revenue in 3-digit or 5-digit zip code)
Other NP or Government Hospitals	Dummy for other non-profit or government hospitals in 3-digit or 5-digit zip code
Education, Less Than High School	Percentage of population over 18 years old without high school diploma in 3-digit or 5-digit zip code

Education, College or More	Percentage of population over 18 years old with a college diploma or more in 3-digit or 5-digit zip code
Household Income \leq \$20,000	Percentage of families with 1989 income of no more than \$20,000 in 3-digit or 5-digit zip code
Household Income \geq \$75,000	Percentage of families with 1989 income of \$75,000 or more in 3-digit or 5-digit zip code
Debt-Asset Ratio	Total long-term liabilities/total assets
Medicaid Days	Medicaid bed days provided as a percent of total bed days provided
Medicare Days	Medicare bed days provided as a percent of total bed days provided
Case Mix Index	Costliness of cases treated relative to national average
Number of Beds	Total beds in hospital
Number of Residents	Total number of hospital residents
Length of Stay	Average length of stay per patient
Occupancy Rate	Bed days/total available bed days
HMO Penetration	(HMO enrollment for the area) / (Total population of the area) in 3-digit or 5-digit zip code
Margin	(Payments - Operating Costs) / Payments

David Cutler provided us with the definition of margin used by the Prospective Payment Assessment Commission.¹ The margin variable used in this paper follows Cutler's prescription.

¹PPS Payments = F470 (DRG Payments—Other Than Outliers) +
F471 (DRG Outlier Payments) +
F477 (Indirect Medical Education Adjustment) +
F479 (Disproportionate Share Adjustment) +
F480 (Additional Payment for High ESRD use).

For this paper, however, it is restricted to the range -0.5 to 0.5.

HMO penetration data for each Metropolitan Statistical Area (MSA) were provided by Laurence Baker, as defined and constructed in his analysis of the measures of HMO penetration.² The data exist for the period from 1990 to 1994. We used the Census' 1993 City Reference File to map the MSA-level HMO penetration data to the hospitals' zip codes.

In addition, we include nine year dummies in all regressions except those in which the HMO penetration variable is present. For models that incorporate the HMO penetration variable, we use only four dummy variables because this variable reduces the sample to the years 1990

Gramm-Rudman-Hollings Adjustment =
F489 (Sequestration Adjustment) /
F488 (Amount Due Provider, Before Sequestration).

Adjusted PPS Payments =
PPS Payment * (1 - Gramm-Rudman-Hollings Adjustment).

Capital Pass-Through Costs =
F376 (Total Medicare Capital Pass-Through Costs) -
F349 (Subprovider Total Capital Pass-Through Costs) -
F350 (Nursery Capital Pass-Through Costs).

Adjusted Capital Pass-Through Costs =
Capital Pass-Through Costs / [1 - (Inpatient Capital Reduction Rate)].

Direct Medical Education Pass-Through Costs =
F440 (Total Hospital Medical Education Pass-Through) -
F413 (Subprovider Total Medical Education Pass-Through Costs) -
F414 (Nursery Medical Education Pass-Through Costs).

PPS Operating Costs =
F458 (Total Medicare Inpatient Operating Costs, Including Pass-Through Costs) -
Adjusted Capital Pass-Through Costs -
Direct Medical Education Pass-Through Costs.

PPS Operating Margin =
(Adjusted PPS Payments - PPS Operating Costs) / Adjusted PPS Payments.

² See Laurence C. Baker, "County-Level Estimates of HMO Enrollment and Market Share," Mimeograph, Stanford University, February 1995.

through 1994. The coefficients for the year dummies are not reported.³

We also applied the following restrictions to the data: All hospitals had to have a positive number beds; we omitted hospitals in the first percentile and 99th percentile of the distributions of (Capital/Revenues) and (Salaries/Revenues), and we omitted hospitals with average lengths of stay in the first and 99th percentiles. We imposed these restrictions to mitigate the influence of outliers.

³ We also estimated identical multinomial logit regressions including Census region dummies; the results we report are robust to this modification.