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The Relationship Between Pricing Behavior and Ownership Type in the Wisconsin Nursing Home Industry, 1984-1995

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Abstract

Previous studies have attributed observed differences in markups between for-profit and not-forprofit firms to differences in organization objectives, without considering potential differences in market power. Using data on Wisconsin nursing homes, I estimate models of price-setting behavior that account for the influence of both market power and organization objectives. I find that not-for-profits charge lower markups than those predicted by a model of profit maximization. Among not-for-profit organizations, religious nonprofits charge the highest markups and government homes the lowest. These results are robust to alternative competitive hypotheses. Implications of these findings for both theory and public policy are discussed.

I. Introduction

A standard maintained hypothesis of most industry models is that firms competing within the industry seek to maximize profits. Such an assumption may be incorrect, however, when not-for-profit firms participate in the industry, as not-for-profits may pursue other objectives instead of, or in addition to, profit. For the purposes of this paper, the not-for-profit organization is defined as any organization that is bound by a nondistribution constraint, which prohibits the distribution of profits to trustees, directors, managers, or stockholders. This definition includes organizations owned and operated by governments, as well as private nonprofit firms. Whether not-for-profits behave identically to for-profits—in the sense of maximizing profits—has direct implications for public policy. If both types of organization maximize profits, it may be more difficult to justify the substantial tax exemptions and subsidies enjoyed by not-for-profits. Profit maximization on the part of not-for-profits would also suggest that the ownership types of two merging organizations are irrelevant to an antitrust analysis of the proposed merger. More generally, greater knowledge of not-for-profit objectives would facilitate the job of regulators who seek to predict organization responses to changes in government policy.

This paper asks whether not-for-profit nursing homes set prices for private payer residents in a way that takes full advantage of their market power, as for-profits are assumed to do. Using data from the Wisconsin nursing home industry, I estimate a standard model of consumer and firm behavior, where market shares are derived from individual utility functions and prices are determined by the first-order condition of a profit-maximizing firm. In the estimation, I ask whether the typical not-for-profit markup of price over the Medicaid reimbursement rate differs significantly from the markup that would prevail if the typical not-for-profit firm fully exploited its market power.[1]

Studies of not-for-profit behavior have generally looked for differences in various choice variables (price, quality, physical location, etc.) and used the findings to bolster or contradict claims that the not-for-profit sector behaves differently from the for-profit sector.[2] In general, however, these studies have not accounted for the influences of consumer demand and competition among firms, both of which also affect organization decisions. Consider the firm's price-setting decision as an example. Competition between firms

that produce very similar outputs will often lead to lower prices for those outputs. Similarly, a firm that produces a product that is not especially popular will not be able to charge a high price. Thus, differences in markups across ownership types may reflect differences in internal objectives, but they may also reflect differences in external circumstances, namely, the effects of price competition and differential market power.

This study contributes to the empirical literature on mixed industries in three ways. First, it employs data and a methodology that permit price-setting behavior to be modeled explicitly. Second, it separates differences between not-for-profit and for-profit markups into two parts: differences due to the systematic differentiation of products across the not-for-profit and for-profit sectors, and differences due to pricing policy, given products with comparable market power. Third, the results do not rely on reported cost data. This is important because appropriate cost data are not generally available to the researcher, who is more interested in economic marginal costs than the more frequently reported accounting average costs. Moreover, to the extent that organizations have incentives to misreport their costs—as when they are reimbursed for their services based on their costs—reported cost data may not be accurate. Finally, profits captured by not-for-profit management may be reported as costs, thereby understating true not-for-profit markups relative to for-profit markups.

The logic of the method employed in this study is as follows: I begin with the null hypothesis that all not-for-profits are profit maximizers and ask whether there is any empirical evidence that contradicts this hypothesis. The model to be estimated consists of a demand equation and the first-order condition (with respect to price) of a profit maximizer. This latter equation relates the firm's product market power, as measured by the own-price elasticity of demand, to the profit-maximizing markup. Intuitively, profit maximizers will set higher markups when demand is more inelastic, as the increase in per unit revenue associated with higher prices more than offsets the decrease in the number of units demanded. More precisely, the first-order condition states that profit-maximizing organizations will set the percentage markup of price over marginal cost such that the product of the markup and the own-price elasticity of demand is equal to negative one.[3] Thus, if not-for-profits seek to maximize profits, they will take full advantage of their market power and set their markups accordingly; if not, they will deviate from this formula. Exactly *how* not-

for-profits might deviate is not clear. While one might expect that firms that are "altruistically inclined" will charge lower markups than profit maximizers, such a result is not necessarily implied by the procedure outlined here, which does not take a stand on what alternative objectives might look like.

The remainder of the paper is organized as follows. Section two briefly reviews the literature on not-for-profit objectives and the relationship between ownership type and market power. The third section describes the model of oligopolistic competition to be estimated, followed by a discussion of the data in section four. The fifth section presents and discusses the results of the model, which is estimated at two different levels of aggregation. The first set of estimates aggregates all not-for-profits into one group and compares their behavior with that of for-profits. The second set of estimates disaggregates the not-for-profit ownership type into three subtypes: religious nonprofit, secular nonprofit, and government. Section six investigates pricing behavior under the alternative competitive hypotheses of collusion and monopolistic competition. Section seven concludes.

II. Not-for-profit objectives

It is not obvious a priori that not-for-profits pursue different objectives from for-profits. Lax enforcement of the nondistribution constraints, coupled with the advantageous tax treatment that not-for-profit organizations receive, could encourage profit maximizers to enter the not-for-profit sector. There may be tradeoffs to doing so, however, as large capital needs may be more cheaply financed in the for-profit sector. The extent to which profit maximizers operate in the not-for-profit sector is not known.

When nondistribution constraints are perfectly enforced, the profit maximizer will be unable to appropriate profits either directly or in a disguised form (such as perquisites). Under such circumstances, it is not rational for a profit maximizer to choose the not-for-profit form; such a goal would be better served in the for-profit sector. Thus, sufficient regulatory enforcement implies that not-for-profits will pursue different objectives, which may be functions of price, the mix of product attributes, location, or some combination of these.

Nondistribution constraints are not perfectly enforced, however, in part because it is difficult to do so under the best of circumstances, and in part because the Internal Revenue Service and state attorneys general have limited resources and options with which to pursue and punish offenders. When nondistribution constraints are sufficiently weakly enforced, profit-oriented entrepreneurs will enter the private nonprofit sector as long as doing so is at least as profitable as remaining in the for-profit sector. This view of not-for-profits suggests that there is no fundamental difference between for-profit organizations and not-for-profit organizations as far as objectives are concerned. Glaeser and Shleifer (2001) present a model in which all entrepreneurs seek to maximize profits and the nondistribution constraint is enforced on the monetary compensation of executives but not on perquisites. In this model, whenever output quality is nonverifiable, the producer has an incentive to cut quality between the time of contracting and delivery. If the nondistribution constraint is not perfectly enforced, a profit-maximizing entrepreneur may find it optimal to incorporate as a not-for-profit since doing so weakens the profit incentive and hence the attendant moral hazard problem.

It is possible that two types of not-for-profit—profit maximizers and organizations with alternative objectives—coexist. This possibility suggests that one should be careful in concluding that observed differences in, for example, markups across sectors imply that for-profits and not-for-profits are fundamentally different, as a relatively small minority of the not-for-profits may disproportionately influence such a result. Additionally, any given not-for-profit could pursue a combination of objectives, one of which might be profits. Under certain circumstances, the presence of not-for-profits pursuing alternative objectives might actually encourage profit-maximizing entrepreneurs to enter that sector.[4] See Hirth (1999) for one such model.

If not-for-profits and for-profits pursue different objectives, their pricing decisions may reflect these differences. While not-for-profits may indeed pursue profits as their primary or even exclusive goal, it is also possible that they pursue other objectives that influence the pricing decision. Other possible objectives relating to price include "maximizing access" to the poor by setting the lowest possible price, or setting prices

to maximize consumer surplus, given the prices of competitors. Objectives may also be combined. For example, an organization may care about both profits and the quantity of output sold.

Other potential objectives are unrelated to price per se. These include the production of quality or certain dimensions of quality, or the choice of physical location. The pursuit of these objectives may imply profit-maximizing behavior with respect to prices. For instance, an organization that seeks to maximize quality may set prices that maximize profits: If the organization earns more money, it can reinvest more in the production of quality. Thus, a finding that not-for-profits behave as pure profit maximizers with respect to price does not necessarily imply that their objectives are identical in all respects to those of for-profits.

Relatively few studies have examined empirically whether not-for-profits and for-profits charge systematically different markups, other things equal. In studies of the nursing home industry, Nyman (1994) finds that not-for-profits charge significantly lower markups than for-profits do when markups are measured as the (percentage) difference between price and the Medicaid reimbursement rate. Weisbrod (1998) also concludes that the expected markup of price over reported average cost is lower for not-for-profit nursing homes.

A more substantial literature on the hospital industry has developed, where Lynk's (1995) finding—which predicts that nonprofit hospitals, unlike for-profits, will not engage in anticompetitive pricing practices upon merging—has spawned a series of studies, some of which challenge Lynk's original result. Papers include Dranove and Ludwick (1999), Keeler et al. (1999), Simpson and Shin (1998), and Lynk and Neumann (1999). Dranove (1988) finds that nonprofit hospitals will raise private payer prices in order to compensate for declines in Medicaid reimbursement rates. Feigenbaum (1987) examines the relationship between market concentration and the financial decisions of medical research charities, finding that nonprofit charities respond to increased market concentration in ways that would be predicted for for-profit firms. These analyses typically examine the relationship between various measures of market concentration and prices and ask whether and how this relationship differs across for-profits and not-for-profits. This paper differs from earlier work in that it makes the distinction between price differences due to differential market power and

price differences due to differences in pricing policy explicit, expressing the total difference as the sum of these two components.

III. A model of oligopolistic competition among profit maximizers

The model characterizes both consumer and firm behavior. On the demand side, the consumers analyzed here are private payers—i.e., those that pay for care with their own funds—seeking skilled nursing care.[5] The consumer chooses, subject to a wealth constraint, the nursing home that she prefers most among all nursing homes in the state. Her preferences are a function of the nursing homes' attributes (staffing, size, etc.), location, and price. On the supply side, the profit-maximizing nursing home recognizes the private payer demand that it will face at any given price and sets prices so as to maximize profits, given the nursing home's attributes and the prices and product attributes of competitors. The nursing home also admits residents who are supported by Medicaid and Medicare. During the period studied here, however, Medicare admissions were rare.[6]

Prices

A structural approach to the estimation of markups is described by Bresnahan (1989). This approach relies on structural specifications of pricing behavior and market shares and assumes that marginal cost is not observed. The researcher can estimate price-cost markups from information on market shares, prices, and product attributes by exploiting a theoretical relationship between a profit-maximizing firm's markup and the slope of the demand curve facing the firm. Specifically, the firm's percentage markup of price over marginal cost should be equal to the (negative) reciprocal of the firm's own-price elasticity of demand. As Nyman (1994) argues, however, markups for private payer nursing home residents are in fact observed in the Wisconsin data and therefore require no estimation, as will be shown below. This simplifies the estimation of the model considerably.

The strategy followed here relies on estimating a generalized version of the type of model described by Bresnahan. This more flexible specification permits not-for-profit markups to deviate from those implied

by the profit-maximizing price. A finding of a statistically significant deviation would demonstrate that not-for-profits systematically fail to behave as profit maximizers. Such a finding would also be consistent with theories that not-for-profits pursue objectives other than exclusively profit.

The model assumes that firms compete in private payer prices, taking the prices and product attributes of competitors as given, while simultaneously facing a predetermined price for Medicaid residents. I assume that the nursing home is unconstrained in its ability to set private payer prices; while some states do limit the private payer prices that nursing homes may charge, Wisconsin is not one of them. I further assume that the nursing home sets a single price for all private payers, as price discrimination among private payers appears to be rare in Wisconsin nursing homes (Updike 1999). Regarding the Medicaid reimbursement rates, they are exogenous to pricing decisions in a given year in that they are set by the government at the beginning of the year, based on historical costs reported to the state by the nursing homes; the reimbursement rates are facility-year specific. It is assumed here that demand by Medicaid residents is large relative to the number of available nursing home beds. This assumption is not necessary for the results that follow and is made only to simplify the exposition.

Consider an environment in which only profit maximizers exist. There are J+1 differentiated products, representing the outputs of J firms and an outside good (good *0*) that serves as a substitute for nursing home care generally.[7] In the models estimated here, home health care represents the outside good. Firms choose per diem private payer prices, given the per diem Medicaid reimbursement rate (r), a firm-specific cost function (C), capacity (k), and demand (D), which is a function of prices and nursing home attributes. They also choose how many Medicaid residents (q^m) to admit.[8] Thus, firm j solves

$$\max_{p_j, q_j^m} p_j D_j(p) + r_j q_j^m - C_j(D_j(p) + q_j^m) \tag{1}$$

$$\text{subject to } D_j(p) + q_j^m \le k_j$$

It is straightforward to show that an interior solution requires

$$\frac{p_j - r_j}{p_j} = -\frac{D_j / p_j}{\partial D_j / \partial p_j} \equiv \frac{1}{|\eta_j|}, \tag{2}$$

where η_j is the own-price elasticity of demand. That is, the percentage markup of the private payer price over the Medicaid reimbursement rate is inversely proportional to the slope of the demand curve faced by the firm. Intuitively, if the firm faces a highly elastic demand curve, with small price increases leading to large losses in market share, the profit-maximizing firm will be unable to raise its price substantially above the reimbursement rate. If, on the other hand, demand is highly inelastic, with even large price changes having little effect on market shares, then the firm that seeks to maximize profits will be able to raise its private payer price substantially above the Medicaid reimbursement rate.

If the capacity constraint binds, the most profitable of three possible solutions will prevail. The nursing home may sell only to private payers, in which case it will choose the price that sets private payer demand equal to capacity. Alternatively, the nursing home may sell only to Medicaid residents. As a third possibility, the nursing home may sell to both private payers and Medicaid residents, in which case it can be shown that the necessary condition for profit maximization is the same as that of the unconstrained problem, i.e., equation 2. In no case—constrained or unconstrained—is the estimation of marginal costs required for the assessment of markups. The data reveal that, among the constrained solutions, the third solution is the most plausible, in that the typical nursing home does in fact tend to admit both private payer and Medicaid residents. During the period analyzed here, only five different nursing homes have no Medicaid residents at the end of the year in any given year: one government home (in two different years), two for-profits, and two secular nonprofits. All nursing homes in the sample had at least one private payer resident at the end of each year. Thus, equation 2 forms the basis for the estimates presented in this study.

If not-for-profit firms strive to maximize profits, then they will price their products according to equation 2. A finding that the markup and the inverse of the own-price elasticity of demand diverge systematically for not-for-profits, however, would be consistent with the argument that not-for-profits do not seek to maximize profits to the exclusion of all other goals. Dummy variables for not-for-profit status (NFP_j) are included in the pricing equation to permit not-for-profit prices to deviate from profit-maximizing levels. The equation to be estimated is

$$p_j - r_j = -\frac{D_j}{\partial D_j / \partial p_j}(1 + \gamma_1 NFP_j) + \gamma_2 NFP_j + \nu_j, \quad (3)$$

where γ_1 and γ_2 are the parameters that permit not-for-profits to deviate from profit maximizing behavior, and ν_j is an error term. I refer to the left side of equation 3 as the price premium in order to distinguish it from the percentage markup, discussed above, which is simply the price premium divided by price. The primary null hypothesis to be tested is

$$H_0 : -\gamma_1 \frac{D}{\partial D / \partial p} + \gamma_2 = 0, \quad (4)$$

where $\frac{D}{\partial D / \partial p}$ is evaluated at the average values of the regressors. This test is perhaps best viewed as a specification test: If not-for-profits set prices as a profit maximizer would, then the null hypothesis will not be rejected and the specification of the model as consisting of the interaction between consumers and profit-maximizing producers is valid. It is important to note that equation 4 does *not* test the hypothesis that not-for-profits and for-profits set identical price premia, other things equal, since $\frac{D}{\partial D / \partial p}$ is a function of both price and not-for-profit status. I return to this point below and compute total price effects in the discussion.

One interpretation of the error term is that it reflects the difference between expected and realized demand. That is, the premium that is set at the beginning of the year is based on expected demand, whereas the researcher observes only realized demand, with the difference generating ex post errors in pricing. The partial derivative of demand with respect to price is a function of the demand variables and parameters, which are discussed below.

Demand

Demand for a given nursing home's beds is assumed to be a function of quality, price, and location. Nursing home quality is difficult to measure directly, but a number of proxies are available in the data. This analysis uses four: the number of nurse aides per bed, lagged one period; the number of registered nurses (RNs) per bed, lagged one period; the number of federal violations with which the nursing home was cited in

the year prior to admission; and the size of the facility, measured in beds. The first two variables capture the size and quality of the nursing staff. More nurses—especially highly trained nurses (i.e., RNs)—are assumed to be positively correlated with higher quality, other things equal, while higher federal violations are assumed to be negatively correlated with quality. Facility size may be a proxy for reputation; alternatively, large facilities may be more popular because prospective residents may be more likely to have heard of them. The variables are lagged based on the assumption that prospective residents use the most recently published data—i.e., data collected in the previous year—in assessing different nursing homes. (Similar results are obtained by using their unlagged counterparts.) While both the researcher and prospective resident can observe these variables, only the prospective resident observes others, such as the cleanliness of the facility and the quality of the food.

Private payer prices are presumed to correlate negatively with demand. Since nursing home care is a large purchase relative to average income, wealth effects will undoubtedly be present. Unfortunately, wealth data for individual nursing home residents were not available, and attempts to simulate wealth and income were unsuccessful, in the sense that the simulated estimations produced very large standard errors. As a result, data on median household incomes by county are included instead, in order to incorporate some notion of income effects into the model.

Regarding location, different individuals will most likely have different preferences over where they live. For example, a prospective nursing home resident may attach high utility to nursing homes in Milwaukee County relative to those in Dane County, even if some of the individual homes in Dane County are more attractive in terms of their other attributes. Thus, the demand for nursing home beds in a given county may be correlated across homes, suggesting that is appropriate to use a nested multinomial logit structure (McFadden 1978, Cardell 1997), where nursing homes are nested by county.

Using the nested multinomial logit structure, the proportion of nursing home residents choosing nursing home *j*—that is, nursing home *j*'s market share—in county *g* is

$$s_j = \frac{e^{U_j/(1-\sigma)}}{\left(\sum_{j\in A_g} e^{U_j/(1-\sigma)}\right)^{\sigma} \sum_h \left(\sum_{j\in A_h} e^{U_j/(1-\sigma)}\right)^{1-\sigma}}, \tag{5}$$

where

$$U_j = X_j'\beta + \alpha \ln(y_j - 365p_j) + \xi_j; \quad (6)$$

A_g is the set of nursing homes in county *g*; *X* and ξ represent observed and unobserved (by the researcher) product attributes, respectively; *y* is annual income; *p* is the per diem private payer price; and σ is a parameter between zero and one measuring the relative strength of location preferences in consumers' underlying utility functions. Berry (1994) shows that it is straightforward to transform equation 3 into the following:

$$\ln(s_j) - \ln(s_0) = X_j'\beta + \alpha \ln(y_j - 365p_j) + \sigma \ln(s_{j|g}) + \xi_j, \quad (7)$$

where $\ln(s_{j|g})$ is the log of nursing home *j*'s market share relative to all nursing homes in county *g*. This is the demand equation that I will estimate.

Note that this model assumes that private payer consumers can choose freely among nursing homes, i.e., that they are not rationed for significant periods of time. This would appear to be at odds with the facts that many nursing homes have waiting lists (Kapur and Weisbrod 2000, Weisbrod 1998) and that the average occupancy rate for a Wisconsin nursing home consistently exceeds ninety percent, suggesting that the homes are capacity constrained. Theory suggests, however, that free choice among private payers is not incompatible with binding capacity constraints. Scanlon (1980) argues that profit-maximizing nursing homes will prefer private payer patients to Medicaid patients. Medicaid patients have their bills paid for them by the government, making the government by far the largest buyer in the market for long-term nursing care. As such, the government determines the price it will pay for Medicaid patients. The nursing home is free, however, to set whatever price it wishes for private payers. If a subset of private payers is willing to pay more than the Medicaid rate for a bed, then the profit-maximizing nursing home will have an incentive to admit those individuals first. Scanlon further argues that the combination of certificate of need (CON) laws limiting the addition of new beds and the low price of care to Medicaid patients creates with excess demand. When excess demand is present, any beds not taken by private payers can always be assigned to Medicaid patients. If this model is correct, then one would expect to observe nursing homes filled to capacity and Medicaid

residents rationed, with private payers bypassing the Medicaid waiting lists and given the next available bed openings.[9]

Estimation details

The system of equations to be estimated is given by equations 3 and 7. I refer to these equations as the pricing equation and the market share equation, respectively. From equation 3, it can be shown that, for nursing home *j* in county *g*,

$$-\frac{D_j}{\partial D_j / \partial p_j} = \frac{(1-\sigma)(y_j - 365 p_j)}{365\alpha(1-\sigma s_{j|g} - (1-\sigma)s_j)}. \tag{8}$$

The pricing and market share equations are estimated jointly according to the generalized method of moments, or GMM (Hansen 1982). The market share equation is estimated with fixed firm and year effects, with the coefficients on time-invariant variables recovered via a minimum distance procedure due to Chamberlain (1982). GMM requires instruments that are correlated with the model's variables but uncorrelated with the pricing equation and market share equation disturbances. In the market share equation, both price and within-county market share are likely correlated with ξ and therefore cannot be used as instruments. The following instruments were employed: lagged nurse aides per bed, lagged RNs per bed, lagged federal violations, the log of staffed beds, the Medicaid reimbursement rate, the number of other nursing homes in the county, average nursing staff per bed at other nursing homes in the county, average staffed beds at other nursing homes in the county. The Medicaid reimbursement rate serves as the instrument for price, while the latter three instruments are instruments for within-county market share, following the suggestion of Berry (1994). The pricing equation uses the same set of instruments but also includes indicator variables for not-for-profit status and whether the nursing home is located in an MSA.

IV. Data

The Wisconsin Center for Health Statistics and the Wisconsin Bureau of Quality Assurance provided the primary data for this study, which include all nursing homes in the state of Wisconsin from 1984 through

1995. The data from the Center for Health Statistics contain the following information for each nursing home: private payer per diem rates; Medicaid and Medicare reimbursement rates; [10] the number of private payer, Medicaid, and Medicare residents as of December 31; street and city address; the full-time equivalent number of registered nurses, licensed practical nurses, and nurse aides; numbers of licensed and staffed beds. The data also include the number of individuals using home care. Data from the Bureau of Quality Assurance include the number of federal violations with which each facility was cited in a given year. I supplement these firm-level data with county-level data from the Bureau of the Census, which provide information on median household incomes and county population for each year in the sample period.

A market is defined as the state of Wisconsin for a given year. For the purposes of estimation, market share is constructed as the number of private payer residents in the nursing home at the end of the year, divided by the total number of private payer residents and home health care users at the end of the year in the state of Wisconsin. Since the typical nursing home's market share relative to all other nursing homes and home care agencies in the state is quite small—on the order of 0.00034—within-county market shares are instead reported in the descriptive statistics. Within-county market shares are formed by dividing the number of private payer residents at the nursing home by the total number of private payer nursing home residents in the county. The within-county market share thus captures a nursing home's market share relative to its closest competitors.

Starting with the original data set, the number of observations was reduced by omitting all records for which relevant variables had missing values or inconsistent values (e.g., a negative number of staffed beds). Nursing homes that are affiliated with hospitals were also omitted, since government reimbursement rules during the period studied provided hospitals with financial incentives to shift patients from hospital beds to nursing home beds. Under such circumstances, hospital-controlled nursing home beds are effectively disguised hospital beds, and it does not make sense to include them in the choice set of the typical individual seeking long-term nursing care. The final data set had a sample size of 3,593—roughly 300 nursing homes per year.

Descriptive statistics are provided in table 1. Not-for-profits constitute slightly more than forty percent of the sample. The average per diem price of private payer care translates into an annual price of roughly $17,500—roughly 51 percent of the average median (household) income in Wisconsin during the sample period. Regarding prices, there are two outliers ($528 per day and $340 per day); both are for-profits. The results of the models are not materially affected by the inclusion or omission of these data points, and the outliers are retained in the sample. Regarding market shares, each nursing home in the county receives roughly eighteen percent of the skilled nursing private payer business, on average. Of all individuals seeking long-term care, somewhat more choose home care than nursing home care: the home care market share for the typical county is roughly 57 percent. The Herfindahl index is computed at the county level, meaning that the reported average reflects an average across counties.[11] Slightly over half of all nursing homes in the sample are located in an MSA.

Table 2 reports average private payer prices (per diem) and markups for the sample, by not-for-profit status. On average, for-profits charge private payers slightly more per day, or approximately 162 dollars more per year, for a nursing home bed. For-profits also charge higher markups—22 percent versus fifteen percent. Figure 1 shows the trends in average markups at for-profits and not-for-profits over time. During the thirteen-year period analyzed, for-profit markups fluctuated between 18.9 and 25.2 percent, while not-for-profit markups moved in a lower range, between 12.3 and 18.4 percent. The coefficients of variation on average markups for the for-profit and not-for-profit ownership types are 9.67 and 11.95, respectively. The average difference between the for-profit and not-for-profit markup has been substantially more variable over the sample period, with a coefficient of variation of 24.35.

Some trends in the nursing home industry over the sample period are documented in table 3. In general, the industry has been reasonably stable. Within-county market shares have fluctuated between seventeen and twenty percent, and the average number of nursing home beds per county fluctuated between 1639 and 1931 during the sample period. The use of home care relative to nursing home care increases over the sample period, sharply in the first two years and more slowly thereafter. The increasing popularity of

alternative means of long-term care may have contributed to the overall decline in the average number of nursing home beds per county from its peak in 1989 to its nadir in 1995.

The data, which identify nursing homes by their Medicaid licensing number, are not suitable for a precise analysis of entry and exit in the industry. Whenever a nursing home enters the industry, a new licensing number appears in the data; likewise, exit corresponds to the removal of the licensing number from the data. However, the Medicaid licensing number for an existing home may change from year to year for a variety of reasons. For example, a change in location or ownership will trigger such a change. The data set's inclusion of new and removal of existing Medicaid licensing numbers over the sample period therefore places an upper bound on actual entry and exit activity in the industry during those years. The data contain observations with 458 distinct Medicaid licensing numbers.

V. Results and discussion

Table 4 presents the results of a series of ordinary least squares regressions, both for descriptive purposes and to serve as benchmarks for the results of the model of oligopolistic competition that follows. The first column regresses the per diem private payer price on a set of product attributes relating to nursing home quality and location. These include an indicator of not-for-profit status, nursing aides per bed (lagged), RNs per bed (lagged), federal violations (lagged), the log of staffed beds, and a variable indicating whether the nursing home is located in an MSA. Median county income, county population, and a time trend are also included as regressors. The results indicate that for-profits charge higher prices than not-for-profits do, ceteris paribus, by roughly $1.56 per day. Also, higher numbers of trained nurses per bed, fewer federal violations, size (as measured by beds), and location outside an MSA are all associated with higher prices. The coefficient on the time trend reveals that real prices are declining over time, other things equal. This may reflect the increasing availability and popularity of home health care options over time.

Results from regressions of percentage markups on product attributes and other variables likely to influence a firm's ability to raise its price above the Medicaid reimbursement rate are reported in the second and third columns of table 4. These other variables include the Herfindahl index (county-level).[12] As in

column one, the coefficient on not-for-profit status in column two is negative and significant, indicating that, on average, not-for-profit markups are seven percentage points lower than those of otherwise comparable for-profits—roughly the difference suggested by the descriptive statistics in table 2. However, the Herfindahl index, which one would expect to be positively correlated with markups, is not statistically significant. The interpretation of this result is that, taken as a group, the typical nursing home will not charge a higher markup in a highly concentrated market than it would in a less concentrated one.

Column three of table 4 adds an interaction term: the product of not-for-profit status and the Herfindahl index. The interaction variable is intended to address the question of whether not-for-profits and for-profits react differently to changes in market concentration. In this formulation, the coefficient on the Herfindahl index is considerably larger and is significant, and the coefficient on the interaction term is negative and significant. The effects are arguably not large: A one standard deviation increase in the Herfindahl index, from 0.19 to 0.40 translates into a seven-tenths of one percentage point increase in markup for the typical for-profit. The not-for-profit effect is measured by the sum of the Herfindahl coefficient and the interaction coefficient. An *F* test of the hypothesis that this sum is equal to zero is rejected at all standard levels of significance, implying that concentration is *negatively* correlated with not-for-profit prices.[13]

Table 5 reports the results of the model of oligopolistic competition, which is the joint estimation of equations 3 and 7. In general, the findings of the regressions in table 4 are confirmed, and the study's primary null hypothesis (equation 4) is rejected, indicating that not-for-profits do not, on average, engage in profit-maximizing behavior with respect to prices. The predicted price premium for a profit maximizer—computed according to equation 8—is $10.23 per day, which corresponds to a percentage markup of 0.213. The model predicts that an otherwise identical not-for-profit will charge a lower premium. Specifically, the difference between the private payer rate and the Medicaid reimbursement rate is $2.40 less at comparable not-for-profits—corresponding to a markup of 0.171—or $876.00 on an annual basis.[14]

Turning to the estimates for the market share equation, note that the insignificant coefficient on not-for-profit status implies that the predicted market power of otherwise comparable not-for-profits and for-profits is statistically the same. Taken together with the negative and significant coefficient on not-for-profit

status in the pricing equation, these results imply that not-for-profit markups are lower not because not-for-profits have less market power than for-profits do but rather for some other reason. One possible explanation for this finding is that profit maximization is not the sole objective of the typical not-for-profit. Not-for-profit nursing home management may pursue other objectives instead of, or in addition to, profit. Another possibility is that not-for-profit nursing home *donors* dislike overt profit-maximizing behavior. If donors tie the size of their gifts to the markups charged by not-for-profit nursing homes, then even a profit-maximizing administration at a not-for-profit nursing home might charge a lower markup than it would in the absence of donations, in order to attract higher donor revenues. A third possible explanation is that not-for-profits set prices inefficiently, perhaps raising prices too infrequently.

Disaggregation of not-for-profits

It is possible that different types of not-for-profit organization—nonprofit with religious affiliation, secular nonprofit, and public—pursue different objectives and set prices differently from each other as a result. If so, then a simple comparison of for-profit and not-for-profit behavior may be misleading. Table 6 presents average prices and markups for the disaggregated not-for-profits. Among the not-for-profits, religious nonprofits charge the highest private payer prices, whereas government facilities have the highest Medicaid reimbursement rates, on average. Religious nursing homes set the highest percentage markups, followed by secular nonprofits; government homes charge the lowest markups. This pattern of markups among not-for-profits (religious highest, government lowest) is stable over the sample period. Only in 1990 was the pattern broken, when government markups slightly exceeded secular nonprofit markups.

Reduced form regressions with not-for-profit status disaggregated are presented in table 7, with and without interactions between the ownership effects and the Herfindahl index. The dependent variable in both columns is the percentage markup. Turning first to column one, note that all three ownership effects are negative and significant, indicating that all three ownership types charge lower percentage markups than otherwise comparable for-profits. Among not-for-profits, religious facilities are predicted to charge the

highest markups, whereas government homes charge the lowest markups on average. Note also the insignificance of the coefficient on the Herfindahl index.

The second column of table 7 interacts the ownership types with the Herfindahl index. For religious homes, the estimated Herfindahl effect is insignificantly different from zero, according to an *F* test. For secular nonprofits and government homes, the estimated effect is both negative and significant. Thus, while religious nursing homes' markups are predicted to be independent of concentration, secular nonprofits and government homes actually charge lower markups in more concentrated markets. One possible explanation for this finding is that secular and government nursing homes pursue access-oriented goals, according to which they seek to provide nursing home care to individuals who would not otherwise have access to it. Pursuit of this goal may entail locating in unprofitable markets where other nursing homes are not present, and charging relatively low prices.[15] Of the three types of not-for-profit, religious nursing homes come closest to profit-maximizing behavior in the markups that they set. Even so, the model predicts that they will set their markups roughly five percentage points below those set by otherwise comparable for-profits, a difference which is significantly different from zero at the one percent level.[16]

The oligopolistic competition model with not-for-profit status disaggregated is a version of equations 3 and 7, with $\boldsymbol{\gamma_1}$ and $\boldsymbol{NFP_j}$ now representing vectors instead of scalars. Attempts to estimate a separate value of γ_2 for each type of not-for-profit were unsuccessful, however, so a common value of that coefficient was estimated instead. Results of the model are presented in table 8. Turning first to the pricing equation, the religious nonprofit, secular nonprofit, and government price effects are all negative and statistically different from zero. The predicted religious nonprofit price premium is $0.87 less ($318 less annually) than the predicted premium for a comparable for-profit. The secular nonprofit and government per diem effects are even larger, at -$1.73 and -$3.75, respectively. The percentage markups implied by these premia are 0.197 for religious nonprofits, 0.182 for secular nonprofits, and 0.145 for government facilities.

While the results of the disaggregated version of the pricing equation generally confirm the results presented earlier in table 5, this is not the case for the market share equation. The not-for-profit coefficient in the market share equation of table 5 was insignificantly different from zero. In table 8, all three coefficients

are statistically different from zero. The effect is positive for religious and secular nonprofits and negative for government nursing homes. Effectively, the previous aggregation of not-for-profits resulted in effects of opposite signs canceling each other. The results of table 8 indicate that, ceteris paribus, religious nonprofits have the most market power, followed by secular nonprofits, then for-profits, then government facilities.

Discussion

Both the aggregated not-for-profit and disaggregated not-for-profit versions of the model easily reject the null hypothesis that not-for-profits set their prices in order to maximize profit. Given that the design of the model is predicated on the assumption of profit maximization, a logical interpretation of the results is that the model is incorrectly specified and that coefficients on not-for-profit status in equation 3 measure the extent of the specification error. While the model estimated here can be used to predict price premia for not-for-profits, a stronger model would rely on a structural specification of not-for-profit behavior.

If not-for-profits do not behave as profit maximizers, the question of why they do not remains. Two explanations are readily available: either they do try to maximize profits but are not very good at it, or they are not trying to maximize profits in the first place. The first explanation points to differential efficiency at for-profits and not-for-profits, the second to differential objectives. It is unlikely that the differential efficiency explanation alone is sufficient to explain the results: If both for-profit and not-for-profit managers seek to maximize profits, it is not clear why the performance of for-profit managers should consistently be superior. If not-for-profits pursue objective functions other than profit, the question of exactly what these other objectives are arises. One possibility is that not-for-profits set lower prices in order to make long-term care more affordable. As suggested above, however, not-for-profits may not be homogeneous with regard to their objectives, even at the level of disaggregation studied here, and any given not-for-profit could pursue multiple goals. For example, not-for-profits may pursue the dual goals of profit and affordable care. Thus, this analysis cannot inform the question of which goals the various types of not-for-profits are most likely to pursue; nor

can it address the question of the extent to which pure profit maximizers have entered the not-for-profit sector.

The data do not indicate whether a nursing home is part of a chain. Prices at firms that are members of a chain will be higher than prices at otherwise comparable non-chain firms whenever the chain internalizes some of the shift in demand resulting from a price increase at one of its member firms. Since for-profit nursing homes are more likely to belong to chains than not-for-profits, the finding of higher price premia at for-profits may reflect an omitted variable bias problem, rather than a failure to maximize profits on the part of not-for-profits. The bias will be greatest when a chain's member firms produce close substitutes. To the extent that the closest substitutes for a given nursing home are other nursing homes in the same county and members of the same chain are generally not located in the same county, the failure to model nursing homes as members of chains should not substantially affect the results.

The finding that the various ownership types have differential market power (table 8) implies that premium differentials are due to a combination of differential market power and differential pricing strategies, not just the latter. Based on the estimated not-for-profit effects from the market share equation, predicted premia for profit-maximizing nonprofits would actually be *higher* than those predicted for for-profits.

Consider a hypothetical not-for-profit nursing home that maximizes profits. It can be shown that the change in the profit-maximizing price premium associated with a change of ownership type from for-profit status to a particular not-for-profit status is

$$\left[\frac{\Delta p}{\Delta NFP}\right]_{\gamma=0} = \tau m\left(\frac{sB+\left(\frac{\sigma}{1-\sigma}\right)s_{j|g}(1-s_{j|g})}{B+(1-\sigma)\left(\frac{1}{\alpha}+s\right)+\sigma\frac{s_{j|g}(1-s_{j|g})}{B}}\right), \tag{9}$$

where *NFP* is the not-for-profit status of interest, τ is the coefficient on that status, $m=\frac{-D}{\partial D/\partial p}$, $B=1-\sigma s_{j|g}-(1-\sigma)s$, and $s_{j|g}$ is the within-county market share. Note that the sign of τ determines whether the change in status is accompanied by an increase or decrease in the predicted price premium, given that both *m* and the bracketed expression on the right side of equation 9 are positive. As an example, if a

particular for-profit charges the typical price premium of $10.19, then an otherwise comparable religious nonprofit that maximizes profits is predicted to charge a markup of $11.73. That is, the additional market power associated with being a religious nonprofit enables the profit maximizing nursing home to charge a premium that is $1.48 higher per day, or $540 higher on an annual basis, than it would be able to charge without religious nonprofit status.[17]

Of course, not-for-profit nursing homes do not behave as profit maximizers, as the rejection of the null hypothesis in equation 4 demonstrates. The price premia charged by nursing homes are in fact influenced by the sum of two components: the effect due to the firm's market power and the effect due to the firm's price-setting behavior. Suppose that the typical for-profit firm charges a premium of *m*. An otherwise identical not-for-profit will then charge a markup of $m + \frac{\Delta p}{\Delta NFP}$, where

$$\frac{\Delta p}{\Delta NFP} = \left(\frac{\tau m \left[sB + \left(\frac{\sigma}{1-\sigma} \right) s_{\cdot|g} (1 - s_{\cdot|g}) \right]}{B + \frac{1-\sigma}{\alpha} + (1-\sigma)(1+\gamma_1)s + \sigma(1+\gamma_1)\frac{s_{\cdot|g}(1-s_{\cdot|g})}{B}} \right) + \left(\frac{\gamma_1 m + \gamma_2}{B + \frac{1-\sigma}{\alpha} + (1-\sigma)(1+\gamma_1)s + \sigma(1+\gamma_1)\frac{s_{\cdot|g}(1-s_{\cdot|g})}{B}} \right). \quad (10)$$

Equation 10 is obtained in straightforward fashion by differentiating equation 3. The first term of equation 10 represents the difference in price premia resulting from differential market power, given price-setting behavior; the second expression is the difference due to differential price-setting behavior, given market power. These differences are summarized for the three different types of not-for-profits in table 9. As the table indicates, the net effect of religious nonprofit status on the price premium is positive, the result of that ownership type's superior market power and a relatively small pricing behavior effect. That is, a religious nonprofit can be expected to charge a premium that is $1.87 higher than an otherwise comparable for-profit because it has the ability to do so. At the same time it will charge $0.87 less because it sets prices differently than a profit maximizer would. The net effect is $1.00. For secular nonprofits and government nursing homes, the effects are negative, in the former case because the pricing behavior effect dominates the market power effect, and in the latter case because both effects are negative.

The results presented in table 9 should be interpreted cautiously. As indicated above, the primary result of this paper suggests that the model described by equations 3 and 7 has been specified incorrectly. Thus, the calculations presented in table 9 should be viewed as suggestive in that they rely upon the strong assumption that the parameter estimates of the market share equation remains correctly specified, even if not-for-profits do not act as profit maximizers.

VI. Alternative models of competition

This paper has thus far assumed that the proper model for analyzing the behavior of profit-maximizing nursing homes is one of oligopolistic competition, in which these homes maximize their own profits, taking the prices of rivals as given when setting their own. However, if this model is incorrect, the estimated differences between for-profit and not-for-profit markups will not be meaningful. In this section, I estimate alternative models of profit-maximizing behavior. The strategy is the same as previously: If not-for-profits do not set prices as for-profits do, then the null hypothesis of profit maximization by not-for-profits will be rejected.

One natural alternative to oligopolistic competition is that of joint profit maximization among all nursing homes in each county. Such coordination is feasible in principle. Relative few nursing homes compete in most counties, and entry was severely constrained during the period under analysis by the CON laws.

In a model of joint profit maximization, each nursing home sets its price in order to maximize the total profits of *all* nursing homes in the county. Thus, continuing with the notation introduced in section three, nursing home *j* in county *g* solves

$$\max_{p_j, q_j^m} \sum_{k \in A_g} p_k D_k(p) + r_k q_k^m - C_k(D_k(p) + q_k^m) \tag{11}$$

$$\text{subject to } D_j(p) + q_j^m \leq k_j .$$

The first-order condition for an interior solution (with respect to private payers) is

$$p_j - r_j = \frac{-D_j}{\partial D_j / \partial p_j} - \frac{\sum_{k \neq j} (p_k - r_k) \partial D_k / \partial p_j}{\partial D_j / \partial p_j} . \tag{12}$$

Note that, since the effect of a rival price increase on own market share is generally positive and the effect of an own price increase on own market share is generally negative, the second term on the right side of equation 12 will generally be positive, implying higher prices than in the model of individual profit maximization (equation 1), given Medicaid reimbursement rates and the structure of demand.

The equation to be estimated is now the following:

$$p_j - r_j = \left(\frac{-D_j}{\partial D_j / \partial p_j} - \frac{\sum_{k \neq j} (p_k - r_k) \partial D_k / \partial p_j}{\partial D_j / \partial p_j} \right) (1 + \gamma_1 NFP_j) + \gamma_2 NFP_j + \nu_j \,. \tag{13}$$

Estimates of the pricing equation parameters, based on the joint estimation of equations 7 and 13, are reported in the first column of table 10a. In contrast with the model of individual profit maximization, the collusion model with aggregated data fails to reject the hypothesis that not-for-profits behave as profit maximizers. Results of the collusion model with not-for-profit status disaggregated are reported in the second column of table 10a. In this specification, the hypothesis of no not-for-profit effect is rejected. In both specifications, the coefficients on staffed beds, MSA, and the log of net income in the model of joint profit maximization are substantially different from those reported in table 7 (the model of individual profit maximization); they are also less likely to be significant.

Table 10b presents the results of a model of monopolistic competition with linear demand. As with the model of oligopolistic competition, the hypothesis of no not-for-profit effect is rejected for both the aggregated not-for-profit and the disaggregated not-for-profit specifications. Thus, with the exception of the collusion model with aggregated not-for-profits, the main pricing result of this paper is robust to the competitive hypothesis invoked in the models. [18]

VII. Conclusions

The results of this paper indicate that not-for-profits charge lower markups than for-profits do, even after accounting for the effects of product differentiation and the influences of competition in the marketplace. This result is robust to a variety of specifications. The more general conclusion is that not-for-

profits set prices that deviate from the prices that profit maximizers would set. This could reflect inefficient price-setting behavior on the part of not-for-profit organizations. It could also reflect organizational preferences that give profits less than full weight. Among not-for-profit organizations, religious nonprofits set the highest markups and government organizations the lowest.

The limitations of this study are significant. To the extent that not-for-profits pursue goals other than profit, the exact nature of these goals remains unknown. Several goals have been suggested in the literature, from the maximization of quality to the maximization of access for the poor. Future work on not-for-profit objectives might attempt to estimate structural models in which these various objectives are nested in a more general objective function, in the spirit of Steinberg (1986). Since it is likely that different not-for-profits pursue different objectives, the search for a single objective function may be misguided. Economists have long recognized that consumers buy differentiated products because their preferences differ over the set of available choices. It is equally intuitive that different not-for-profits will *produce* different products because their organizational preferences (loosely defined) differ over potential outputs. Successful models will therefore need to estimate firm-specific parameters, which in turn will require detailed panel data.

From a policy perspective, the results of this study suggest that the preferential treatment that not-for-profits receive may not be undeserved. To the extent that one can discount the role of relative inefficiency in explaining the differences in institutional behavior across ownership types, this study suggests that not-for-profits do pursue objectives other than profit. At a minimum, the results indicate that not-for-profits set lower prices than for-profits do, other things equal, which would appear to have a positive effect on social welfare. One perspective on this finding is that the citizenry values affordable long-term care for its elderly (even its private-paying elderly) and therefore willingly subsidizes long-term care through the government. However, it is not at all clear that the subsidies and tax exemptions available to not-for-profits are the *cause* of the lower prices observed at not-for-profits; further research on the larger question of the motives for not-for-profit entry is undoubtedly needed before such a claim can be made with confidence.

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[1] The focus on prices is not meant to suggest that other potential organization decisions are not equally worthy of analysis. Different types of organizations may place particular emphasis on certain product attributes or where they locate. Pricing behavior is relatively straightforward to model, however, and provides a natural starting point for an analysis of organizational behavior.

[2] See, for example, Weisbrod (1998) and the extensive list of references provided there.

[3] The percentage markup is defined as the difference between price and marginal cost, divided by price.

[4] If a subset of consumers ("uninformed consumers") cannot observe output quality, and if it is known that some not-for-profits focus on the provision of high quality as their primary objective, then the uninformed consumers may be more likely to trust the not-for-profit sector to provide higher quality. Some profit-maximizing entrepreneurs may then have an incentive to enter the not-for-profit sector in order to capture the business of the uninformed consumers.

[5] The nursing home will also generally admit individuals seeking other levels of care, such as intensive skilled nursing care and intermediate care. Skilled nursing care individuals represent the significant majority of admissions.

[6] Nationwide, Medicare paid for only five percent of all long-term care expenditures in 1990, as compared with Medicaid (45 percent of all expenditures) and private funds (45 percent) (Levit et al. 1991). It should be noted, however, that toward the end of the period analyzed here, Medicare as a source of payment increased sharply, as nursing homes increasingly recognized the profitability of individuals financed by Medicare and sought to provide the necessary services to attract them.

[7] If the outside good were omitted, the model would predict unchanged demand for nursing home care in response to a uniform price increase across homes, which is implausible.

[8] As indicated above, nursing homes also admit Medicare patients. In general, Medicare reimbursement rates are high relative to private payer and Medicaid prices, suggesting that profit-maximizing nursing home might prefer Medicare residents to both private payer and Medicaid residents. However, very few Medicare residents were admitted into nursing homes during most of the period studied. Moreover, Medicare reimburses long-term care for a relatively short period of time. Many Medicare residents become Medicaid residents once this period expires. To the extent that Medicare residents are preferred to both private payers and Medicaid residents, one can think of the capacity variable as capacity net of Medicare residents. The basic results of the model remain unchanged.

[9] Such leapfrogging is legal in Wisconsin, where nursing homes are permitted to discriminate by payer source in admissions.

[10] Prices and reimbursement rates have been deflated according to the Bureau of Labor Statistics' medical care services consumer price index.

[11] The Herfindahl index is the sum, taken over all nursing homes in the county, of the squared within-county market shares.

[12] A common criticism of this type of regression is that the Herfindahl index is likely to be endogenous: the prevailing market configuration may be a consequence of firms' pricing behavior. In the case of Wisconsin nursing homes, however, this criticism is less likely to be valid. The state enforced certificate-of-need legislation during the period of the sample, which severely constrained entry.

[13] One might speculate that the lack of a strong concentration-price relationship among for-profit nursing homes is the result of the presence of not-for-profit nursing homes that charge lower prices.

[14] The change in price associated with a change in ownership type is given by

$$\frac{\Delta p}{\Delta NFP} = \frac{\gamma_1 \dfrac{(1-\sigma)(y-365p)}{365\alpha[1-\sigma s_{\cdot|g} - (1-\sigma)s]} + \gamma_2}{1 + \dfrac{(1-\sigma)}{\alpha[1-\sigma s_{\cdot|g} - (1-\sigma)s]} + \dfrac{(1+\gamma_1)[\sigma s_{\cdot|g}(1-s_{\cdot|g}) + (1-\sigma)s(1-\sigma s_{\cdot|g} - (1-\sigma)s)]}{[1-\sigma s_{\cdot|g} - (1-\sigma)s]^2}}$$

when there are no market share effects present. This is obtained by taking the difference between the premium predicted for not-for-profits and that predicted for for-profits and solving for $\frac{\Delta p}{\Delta NFP}$.

[15] Such an explanation relies on the assumption that regressors such as MSA, county population, and household income are imperfect controls for location and county demography.

[16] The effect measured here is the product of the religious nonprofit Herfindahl coefficient and the average Herfindahl index for the sample, added to the religious nonprofit ownership dummy coefficient.

[17] The corresponding per diem effects for profit-maximizing secular nonprofits and government facilities are $0.69 and -$2.27, respectively.

[18] Complete model results for all specifications estimated in this section are available from the author upon request.

Table 1. Descriptive statistics

	Mean	Std. Deviation	Minimum	Maximum
Not-for-profit (1/0)	0.417	0.493	0.000	1.000
Private payer price (per diem)	47.847	12.619	24.888	528.443
Within-county market share of private payers	0.184	0.204	0.001	1.000
Herfindahl index	0.194	0.212	0.006	1.000
Nurse aides per bed	0.351	0.086	0.000	0.801
RNs per bed	0.076	0.031	0.017	0.292
Staffed beds	128.012	86.689	16.000	749.000
Located in MSA (1/0)	0.548	0.498	0.000	1.000
Federal violations	8.371	10.494	0.000	133.000
Home care market share	0.571	0.159	0.000	0.961
Sample size	3605			

Annual data, pooled over the sample period. Annual data were recorded on December 31.
Within-county market share of private payers is defined only with respect to other nursing homes in the county; home care is not included.
Home care market share is the number of home care users divided by the sum of home care users and nursing home users in the county.

Table 2. Average prices and markups, by ownership type

	Not-For-Profit	For-Profit
Private payer price ($/day)	47.589 10.158	48.032 14.116
Medicaid reimbursement rate ($/day)	39.617 5.609	36.676 36.676
Percentage markup	0.151 0.106	0.221 0.104
Sample size	1502	2103

Standard deviations are in small print. Annual data, pooled over the sample period. Annual data were recorded on December 31.

Table 3. Trends in the Wisconsin nursing home industry, 1984-1995

	Percentage Markup	Within-County Market Share of Private Payers	Beds per County	Home Care Market Share
1984	0.181	0.188	1784.670	0.517
1985	0.191	0.193	1878.660	0.557
1986	0.199	0.174	1849.820	0.580
1987	0.209	0.185	1648.580	0.561
1988	0.203	0.190	1800.540	0.557
1989	0.198	0.188	1931.280	0.561
1990	0.168	0.185	1765.250	0.567
1991	0.163	0.200	1751.810	0.572
1992	0.162	0.180	1748.430	0.570
1993	0.197	0.186	1645.840	0.594
1994	0.205	0.175	1656.190	0.596
1995	0.219	0.170	1638.960	0.608

Within-county market share of private payers is defined only with respect to other nursing homes in the county; home care is not included. Home care market share is the number of home care users divided by the sum of home care users and nursing home users in the county.

Table 4. Price and percentage markup regressions

	Dependent Variable		
	Private Payer Price (Per Diem)	Percentage Markup	Percentage Markup
Not-for-profit	-1.5631 *	-0.0796 *	-0.0597 *
	0.3898	0.0032	0.0044
Herfindahl index (county)	-	-0.00794	0.0322 *
		0.0082	0.0101
Not-for-profit x Herfindahl index	-	-	-0.1006 *
			0.0148
Nurse aides per bed, lagged one period	3.2296	0.0786 *	0.0695 *
	2.4599	0.0204	0.0203
RNs per bed, lagged one period	66.8255 *	0.3084 *	0.3107 *
	7.5435	0.0626	0.0622
Federal violations, lagged one period	-0.0454 *	0.0000	0.0000
	0.0180	0.0001	0.0001
Staffed beds (log)	4.6203 *	0.0389 *	0.03928 *
	0.34988	0.00291	0.00289
MSA	-1.4357 *	-0.0384 *	-0.0396 *
	0.5410	0.0045	0.0045
Median household income (000's)	0.2494 *	0.00407 *	0.00434 *
	0.04893	0.00041	0.00041
County population (000's)	0.0125 *	0.00011 *	0.00011 *
	0.0007	0.00001	0.00001
Year	-0.6436 *	-0.0018 *	-0.0018 *
	0.0601	0.0005	0.0005
Constant	68.4609 *	0.0128	-0.0070
	5.2651	0.0436	0.0434
R^2	0.2294	0.3137	0.3324
N	3605	3605	3605

Ordinary least squares. Standard errors are in small print. * Significant at the 10% level or better.

Table 5. Parameter estimates of the oligopolistic competition model

Pricing Equation	
Not-for-profit	15.8496 *
	2.2294
Not-for-profit interacted with elasticity term	-1.8145 *
	0.2036
Market Share Equation	
Not-for-profit	-0.0178
	0.0339
Nurse aides per bed, lagged one period	0.5420 *
	0.2990
RNs per bed, lagged one period	-1.4534
	1.7658
Federal violations, lagged one period	-0.0043 *
	0.0016
Staffed Beds (log)	0.0793
	0.2754
Income minus annualized price (log)	1.2435 *
	0.3904
Within-county market share (log)	0.7620 *
	0.0814
Constant	-11.6279 *
	0.1697
Price Premium	10.23
Reject Ho?	Yes
N	3605

Generalized method of moments, with fixed firm and year effects included. Standard errors are in small print.
* Significant at the 10% level.

Table 6. Average prices and markups, by ownership type (disaggregated)

	Church-Related Nonprofit	Secular Nonprofit	Government	For-Profit
Private payer price ($/day)	49.038 49.038	46.313 10.338	47.210 9.608	48.032 14.116
Medicaid reimbursement rate ($/day)	39.024 5.078	38.436 5.380	40.958 40.958	36.676 4.002
Percentage markup	0.188 0.100	0.150 0.112	0.119 0.098	0.221 0.104
Sample Size	511	407	584	2103

Standard deviations are in small print. Annual data, pooled over the sample period. Annual data were recorded on December 31.

Table 7. Markup regressions, not-for-profits disaggregated

	(i)	(ii)
Church-related nonprofit	-0.0535 *	-0.0524 *
	0.0046	0.0063
Secular nonprofit	-0.0745 *	-0.0510 *
	0.0050	0.0068
Government	-0.1085 *	-0.0818 *
	0.0046	0.0064
Herfindahl index (county)	-0.0105	0.0276 *
	0.0081	0.0101
Church-related x Herf. index	-	-0.0014
		0.0239
Secular x Herf. index	-	-0.1284 *
		0.0252
Government x Herf. index	-	-0.1170 *
		0.0192
Nurse aides per bed, lagged one period	0.0694 *	0.0610 *
	0.0202	0.0201
RNs per bed, lagged one period	0.3379 *	0.3506 *
	0.0619	0.0615
Federal violations, lagged one period	-0.0001	0.0000
	0.0001	0.0001
Staffed beds (log)	0.0453 *	0.0445 *
	0.0030	0.0030
MSA	-0.0393 *	-0.0406 *
	0.0044	0.0044
Median household income (000's)	0.00405 *	0.00436 *
	0.00041	0.00041
County population (000's)	0.00010 *	0.00010 *
	0.00001	0.00001
Year	-0.0018 *	-0.0017 *
	0.0005	0.0005
Constant	-0.0108	-0.0309
	0.0432	0.0429
R^2	0.3309	0.3414
N	3605	3605

Ordinary least squares. The dependent variable is the percentage markup. Standard errors are in small print.
* Significant at the 10% level.

Table 8. Oligopolistic competition model, not-for-profit status disaggregated

Pricing Equation	
Church-related nonprofit	18.4784 *
	2.2230
Secular nonprofit	17.5469 *
	2.4420
Government	15.3537 *
	2.2145
Not-for-profit interacted with elasticity term	-1.9055 *
	0.2068
Market Share Equation	
Church-related nonprofit	0.2919 *
	0.0493
Secular nonprofit	0.1364 *
	0.0529
Government	-0.4623 *
	0.0494
Nurse aides per bed, lagged one period	0.6091 *
	0.2981
RNs per bed, lagged one period	-1.1505
	1.7584
Federal violations, lagged one period	-0.0045 *
	0.0016
Staffed beds (log)	0.1139
	0.2740
Income minus annualized price (log)	1.3248 *
	0.4025
Within-county market share (log)	0.7469 *
	0.0842
Constant	-11.8564 *
	0.1840
Price Premium	10.19
Reject Ho?	Yes
N	3605

Generalized method of moments, with fixed firm and year effects included. Standard errors are in small print.
* Significant at the 10% level.

Table 9. Summary of price premium differentials

	Difference in Premium due to Differential Market Power	Difference in Premium due to Differential Pricing Behavior	Total Difference in Premium
Religious nonprofit	$1.87	-$0.87	$1.00
Secular nonprofit	0.87	-1.73	-0.85
Government	-2.87	-3.75	-6.61

Differentials are computed with respect to otherwise comparable for-profit nursing homes; the differentials reflect differences in per diem prices.

Table 10a. Parameter estimates of the joint profit maximization model pricing equation

	(i)	(ii)
Not-for-profit	1.7039 1.4719	-
Church-related nonprofit	-	4.2564 * 1.6542
Secular nonprofit	-	2.5388 1.6729
Government	-	1.3000 1.3958
Not-for-profit interacted with elasticity term	-0.4793 * 0.1249	-0.5609 * 0.1305
Price premium	14.42	14.40
Reject Ho?	No	Yes
N	3605	3605

Generalized method of moments, with fixed firm and year effects included. Standard errors are in small print.
* Significant at the 10% level.

Table 10b. Parameter estimates of the monopolistic competition model pricing equation

	(i)	(ii)
Not-for-profit	4.3375 * 2.1866	-
Church related nonprofit	-	6.0985 * 2.7826
Secular nonprofit	-	4.7352 * 2.1090
Government	-	3.0933 * 1.8474
Not-for-profit interacted with elasticity term	-0.7442 * 0.1626	-0.7586 * 0.1632
Price premium	11.70	11.61
Reject Ho?	Yes	Yes
N	3605	3605

Generalized method of moments, with fixed firm and year effects included. Standard errors are in small print.
* Significant at the 10% level.

Figure 1. Average for-profit versus not-for-profit markups, 1984-1995