Nonprofit and Voluntary Sector Quarterly

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The authors identify differences in performance among for-profit, nonprofit, and government-owned nursing homes in Minnesota. They investigate whether homes of diverse ownership types distribute their surpluses differently, if those differences narrow over time, and if the various ownership types react differently to changes in the regulatory environment. Government-owned and nonprofit homes spend more per resident day for nursing care costs than do independent for-profit homes. Chain affiliation is important in explaining persistent spending differences. There is an agency problem: Nursing homes belonging to chains behave differently from their independent counterparts. Secular nonprofits belonging to national chains spend less of their surplus on nursing care costs after regulations allowed more of this form of spending to be recouped in rates charged to the residents. The secular firms affiliated with national chains spend less on nursing care than the control group. As the predicted surpluses of for-profit chains increase, the owners' compensation falls.

INTRODUCTION

Policy makers are keenly interested in both the efficient provision of nursing home services and the quality of care provided. The interest reflects the growing proportion of nursing home expenditures as a percentage of total medical care costs as the population ages. Because the nursing home industry includes a mixture of for-profit, nonprofit, and government entities, much

research has related efficiency and care quality to the nature of the ownership and organizational form of the homes.

Nonprofits receive subsidies, are exempt from land taxes, and compete with their for-profit counterparts. Presumably, policy makers grant subsidies and exemptions because they believe that the performance of nonprofit firms is socially superior to that of for-profits. The Minnesota nursing home industry includes for-profit, nonprofit religiously affiliated, nonprofit not religiously affiliated (secular), and government-owned homes. Many of the for-profit and nonprofit homes are incorporated or are part of either state (Minnesota only) or national chains of nursing homes. Available data on the variety of ownership forms for Minnesota's nursing home industry present an opportunity to test whether performance differs across ownership forms.

This investigation has public policy implications for industry regulation. If firms with diverse ownership types perform differently, regulators might craft incentives to induce the socially desired behavior. This research can guide investigations of nursing homes in other states that may not regulate nursing homes or may not include efficiency incentives in their regulations. A comparison of performance under different regulatory environments could suggest an optimal set of nursing home regulations. Also, the analysis and models developed here can be used in other industries where for-profit and not-for-profit firms coexist. Thus, the research and its findings have general applicability in the endeavor to understand the nature of not-for-profit firms.

THEORY AND LITERATURE

Theoretically, nonprofit organizations exist because of an asymmetry of information between buyers and sellers. When the quality of the good or service is difficult to evaluate (e.g., health care, education, culture, and religious salvation), sellers may charge much more for a service than it costs to produce, or misrepresent the worth of the service, or both. Nonprofit firms provide some assurance of the product's quality (Hansmann, 1980; Weisbrod, 1988). If the seller is not profiting from consumer ignorance, the buyer places more faith in the seller's candor. Performance differences can manifest themselves in efficiency or quality differences. These performance differences stem from different goals of firms, which may vary by ownership type, managerial sorting among ownership types, and organizational scope regardless of ownership type.

Hansmann (1980) placed nonprofit organizations in four categories: donative/mutual, donative/entrepreneurial, commercial/mutual, and commercial/entrepreneurial. Mutual nonprofits are controlled by patrons; a self-perpetuating board of directors controls commercial nonprofits. Donative nonprofits rely on gifts as a major source of revenue, whereas commercial nonprofits rely on revenue from sales of services. His classification allows that the spans between donative and commercial categories and between mutual

and entrepreneurial categories are continuums. Religious homes having perpetuating boards dedicated to patient interest may serve as the bridge between the mutual and entrepreneurial forms of nursing homes.

Whereas donative firms seldom compete with for-profits, commercial nonprofits almost always compete with for-profit firms. Hansmann (1980) argued that nursing homes are one sector of the economy where the nonprofit facilities are "just a cover for proprietary activity" because of the ease of circumventing the nondistributional constraint. The payments to nursing homes generally come from Medicare, Medicaid, insurance companies, or from a source other than the person receiving care. Because quality of care may be difficult to ascertain, a low-quality provider may go undetected for a long period of time. The nondistributional constraint faced by nonprofit entities signals a possibility that nonprofit firms may have the incentive to provide better care than their for-profit counterparts. A stringent regulatory environment might be necessary for nursing home residents to receive the quality of care that they or their family believe they are receiving.

For-profit firms have strong incentives to maximize the difference between revenue and cost. Profit maximization may lead the for-profit firms to exploit consumer ignorance in a monopolistic unregulated market. However, if revenue is constrained by regulation or competition, profit maximization requires efficient production. The incentive to be efficient works less directly on the not-for-profit suppliers, who face distributional constraints on any surplus of revenue over costs. Moreover, managers of not-for-profit firms may have goals other than profit maximization. These managers would be indifferent as to whether they operate efficiently or generate a surplus unless these actions furthered their own goals as well.

Managerial sorting implies that the behavior of organizations differs by ownership type (Weisbrod, 1988). Managers of the different forms of organizations may have different personal goals or missions. The reasons they gravitate to a particular type of organization are important and can affect organizational performance. Managers of religiously affiliated nonprofit organizations may sacrifice personal income to promote social and spiritual welfare. They would be less likely to exploit informational asymmetries to generate higher returns for themselves.

Organizational scope, as opposed to ownership type, can also affect performance differences. Some nursing homes are part of national chains made up of hundreds of facilities. Others belong to chains composed of homes located within a single state. Still others are owned and operated by government agencies. As bureaucracies expand, agency problems intensify.

The economic theory of the firm, based on the assumption of profit maximization, rests on strong empirical support and predicts well. Studies of executive compensation conclude that profits are important determinants of administrative pay, even in large corporations with diffuse ownership. Nevertheless, statistical studies show important distinctions among shareholder-owned, manager-operated corporations and owner-operated

proprietorships. The differences result from an agency problem: a clash between the goals of owners and the aims of management. Specifically, whereas the owner-proprietor is a single-minded profit maximizer, the corporate executive maximizes a multivariate utility function within which shareholder profit is but one argument. Managers increase their own compensation or the perquisites of their office at the expense of profit. In firms such as nursing homes, where the quality of the service provided is difficult to judge because of information asymmetries, managers may exploit information deficiencies to further their purposes at the expense of profits or product quality.

Managerial sorting may also tie into agency problems. Managers who share the goals of the organization are most likely to work in nursing homes that do not belong to a chain. Chain membership extends the administrative bureaucracy across several homes, often at diverse locations. We expect the most severe departure between individual and organizational goals in chains containing affiliates from outside of Minnesota. This implies that nursing home chains, regardless of ownership type, may incur agency problems. Agency problems may result in performance differences between chains and their nonchain counterparts, and they may be a source of performance differences independent of other causes.

Moreover, firms in regulated industries and state-owned firms face different constraints than do others. Managers of regulated firms may not behave consistently with the assumption of profit maximization. Edwards' (1977) examination of the regulated banking industry, for example, provided evidence that profit maximization is not the managerial objective in that industry. Arguments that bureaucrats' salaries are closely tied to the size of their agency imply that bureaucrats are output maximizers. However, evidence supporting this argument is meager (Johnson & Libecap, 1989).

The empirical literature on care quality differences between for-profit and nonprofit nursing homes is mixed. Weisbrod (1988) and Weisbrod and Schlesinger (1986) presented evidence from the nursing home industry supporting the theory that ownership type affects performance. Using various care quality indices, such as violations data, customer satisfaction survey data, waiting lists, sedative use, and input utilization, they found substantial differences in the quality of care between for-profit and nonprofit nursing homes. They acknowledged data deficiencies of the various proxies for care quality, but they could not identify more appropriate quality proxies. Weisbrod and Schlesinger found that nonprofit nursing homes behave as bonoficers; specifically, those homes have goals concerned with fair distribution, output quality, and informed customers. Moreover, they found that religiously affiliated and government-operated nursing homes were more likely to be bonoficers than were other nonprofits. Weisbrod and Schlesinger also argued that differences in performance could result from managerial sorting.

Nyman (1988) and Nyman and Bricker (1989) found that for-profit nursing homes provide services at lower costs than nonprofit homes. Nyman and

Bricker used patient days in various nursing care categories as their output measures. Using Data Envelopment Analysis (DEA), they related these output measures to various nursing care inputs to arrive at an efficiency score. Regressing the efficiency score against nursing home characteristics including ownership form revealed the relative efficiency of for-profit and nonprofit nursing homes. Nyman and Bricker concluded that part of the lower cost exhibited by for-profits was from greater efficiency and part came at the expense of the quality of care. Nevertheless, because nursing homes exhibiting greater efficiency also had fewer violations, they concluded that the greater output per input associated with for-profit nursing homes represented economic efficiency and not just technical efficiency.

With 1987 data from Michigan, Fizel and Nunnikhoven (1992) used DEA and determined that for-profit homes were more technically efficient than nonprofit homes. Valdmanis (1992) concluded that government-owned hospitals were more technically efficient than the private, not-for-profit facilities in Michigan during 1982. Neither study addressed the issue of the relative quality of care between the different organizational forms.

Marmor, Schlesinger, and Smithey (1987) reported the results of comparative studies of efficiency and care quality between for-profit and nonprofit health institutions. Cost-of-care studies indicated that for-profit nursing homes have lower average costs of service, ceteris paribus. They reported mixed results in measuring the relative quality of nursing home care between for-profit and nonprofit facilities. The for-profits were found to have provided the full spectrum of higher, similar, and lower care quality compared with their nonprofit counterparts. Cost studies from the hospital industry show minor and inconsistent cost differences between the different ownership forms. When physicians play an active role in hospital administration, cost differences disappear. Marmor et al. argued that this indicates that professional standards (presumably the demand for higher quality services) reduce incentives for cost reduction.

Two recent studies in this journal reinforce these findings. Bradley and Walker (1998) found that the nature of educational efforts toward advance care planning varies by ownership type. Specifically, they found that nonprofit nursing homes were more likely to have more continuous and comprehensive planning programs than for-profit nursing homes. Wolff and Schlesinger (1998) found that increased competition among psychiatric hospitals increased the willingness of not-for-profit institutions to admit insured and underinsured patients.

Using data for more than 400 Minnesota nursing homes from 1984 through 1991, we identified differences in performance among for-profit, nonprofit, and government-owned firms (Luksetich, Edwards, Carroll, & Persons, 1992).[1] We also examined whether religious affiliation or chain affiliation affected nursing home performance and found some significant performance differences across organizational type.

Religious nonprofit firms experience higher average nursing costs than the other ownership forms. They also experienced higher average dietary expenses and plant and maintenance costs than the control group (for-profits without chain affiliation). Religious nonprofits contracted higher nursing costs per resident day and spent more on noncare operating costs.

Neither government-owned firms nor secular nonprofits spent more than the control group on average nursing costs. They did follow the religiously affiliated nonprofits' tendency to spend more on dietary, laundry and linen, housekeeping, and plant and maintenance compared to the control group. Government-owned firms consistently spent more on other operating expenses, but secular nonprofits increased their relative spending in these areas only after 1988 when changes in regulation allowed for increased spending on nursing care. Chain affiliation had no effect on relative spending in these areas. National chains started spending more on noncare operating costs in 1989, but no other spending differences could be attributed to chain affiliation.

The greater spending by nonprofits on nursing and other costs per resident day could represent either higher quality or inefficiency. If greater spending in these areas represents inefficiency, we would also expect firms to spend more per resident day for general and administrative purposes. All types of not-for-profits spent less on general and administrative expenses than the control group unless they were affiliated with chains. Secular nonprofits belonging to Minnesota chains and, between 1989 and 1991, both private homes and religiously affiliated homes belonging to national chains spent significantly more on general and administrative expenses than the control group. We also found that the independent not-for-profit firms provided greater compensation for their head administrator than either the control group or chain affiliates.

In summary, our earlier findings indicate that both ownership form and chain affiliation affect nursing home performance. This suggests that a model of nursing home behavior be developed (a) to further examine the behavioral differences of nursing homes, (b) to determine whether they respond differently to changes in regulation, and (c) to determine how they allocate any earned surplus. Such a model allows us to determine an objective function for different ownership types. Understanding the differences in objective functions by ownership type has important public policy implications. In the following sections, we describe the nature of the Minnesota nursing home industry, explain regulations of the industry, and develop and then estimate a simultaneous econometric model of nursing home behavior.

MINNESOTA NURSING HOMES: NATURE AND DATA

Minnesota nursing home regulation in its present form began in 1984. In 1988, significant changes in the regulation increased the allowable spending limits for facility operating costs including nursing care. There are more than 440 nursing homes in Minnesota. Minnesota nursing home regulations set

rates, preclude entry, and provide an efficiency incentive to encourage savings on expenses other than nursing care. Minnesota regulations cover nursing homes electing to participate in Minnesota's Medical Assistance (Medicaid) program. Nursing homes electing to participate must comply with the regulations covered in the state health plan. The U.S. Health Care Financing Administration (HCFA) approves these same regulations. Because of Medicaid's significant market share in the long-term care industry, most nursing homes participate in the Medicaid program and comply with the reporting requirements. In Minnesota, 448 of 449 licensed nursing homes in 1989 participated in the program.

Reporting requirements for Medicaid and HCFA are comprehensive. The *Annual Cost Report for Long-Term Care Facilities* (Department of Human Services, State of Minnesota, 1984-1991) provides the primary source of information used by regulators in establishing rates and monitoring performance. Each nursing home completes a report that identifies its ownership form, whether it is part of a chain or is hospital affiliated, the case mix of the residents, along with detailed cost data, and the size and location of the nursing home. Also reported are the compensation and salaries of owners and administrators.

The Minnesota Department of Human Resources regulates Minnesota nursing homes. Officials from the department indicate that Minnesota regulations were designed to assure that the resident care did not greatly deviate below the norm. The ownership form or chain affiliation of the organization should not materially affect the performance of a nursing home. If regulations work as anticipated, nursing home performance should be independent of the nature of the organization or its control.

EFFICIENCY, QUALITY, AND REGULATION

Minnesota regulations discourage skimping on the care costs that are considered important for resident welfare. The rates charged by nursing homes are set by the state. They are based on allowable costs and include an efficiency incentive. The basic rate a facility charges is the arithmetic sum of three classifications of allowable costs: nursing and other care-related costs, noncare operating costs, and facility costs (capital costs and real estate taxes). An efficiency incentive of up to $2 per resident per day may be included in the rates. Actual charges are the basic rate weighted by the case mix, an index of the intensity of care.

Allowable costs vary within ranges based on industry norms. Specifically, if a facility's costs are within the allowable range, they can be recouped. The allowable cost range for a particular nursing home is determined from the median of all facilities' costs in their geographic area. The geographic groups are neither contiguous, nor do the counties within the groups face the same costs of living. As the degree of urbanization of the geographic area increases,

allowable costs, and therefore allowable rates, also increase (Office of Legislative Auditor, 1991).

Operating costs are grouped into two general categories: nursing and other care-related care costs and noncare operating costs. Reported nursing care costs include spending on care-related items. These care-related items include nurses' salaries, nursing supplies, medication, nurses training, and consultant services (physicians, nursing, pharmacy, etc.). Salaries for social workers, therapists, volunteer coordinators, beauty shop, and religious personnel are included in this measure. Also included are expenditures such as radio, television, and telephone; consulting fees; therapy supplies; and costs for social services and activities for the general resident population.

Noncare operating costs include some costs for maintenance, dietary, and other amenities that are deemed not as crucial for quality care. Housekeeping, laundry and linen, plant operations and maintenance, and the cost of the social activities for the general population are included in this category. Noncare operating costs also include administrative salaries and other administrative expenses. As long as these costs are within industry norms, they are allowable costs and recoverable in rates. The size of the efficiency incentive depends solely on the ratio of the noncare operating costs to industry norms. A home's efficiency incentive can increase to the maximum of $2 per resident per day as the noncare operating costs decline below the median for all nursing homes in the geographic designation. Profit maximizers have an incentive to minimize noncare operating costs.

Nursing care costs are recoverable in the basic rate even if they are above the geographically determined norm. Competition is unlikely to drive down nursing costs. When third parties pay the expenses, quality replaces price as an argument in the demand for care (Seldon & Khandker, 1990). Indeed, regulators raised the nursing cost ceilings in 1988 to encourage greater spending on nursing care. Because spending in this area is encouraged and recouped in the rates, profit-maximizing nursing homes have an incentive to optimize nursing care costs to increase resident days. Care maximizers will incur nursing costs beyond the profit-maximizing level. Differences in average nursing costs between types of organizations that are not explained by case mix should capture differences in care quality.

The surplus a home earns is computed by multiplying its efficiency incentive by resident days. Profit-maximizing nursing homes have an incentive to increase occupancy rates because the surplus increases as resident days increase. Because rates are based on the previous year's costs, the per resident charges for overhead are based on the industry average occupancy rate. An allowable property cost can be charged to residents. The allowable property cost is based on the industry norm of 95% occupancy rate. If a home's occupancy rate is more than 95%, it can pass on a higher property cost than is actually incurred. Conversely, a facility with occupancy lower than 95% will not be able to recuperate the total amount of allowable property costs. Therefore,

holding the efficiency incentive constant, increased occupancy increases the total earned surplus.

Greater nursing care spending implies a more desirable facility and leads to a higher occupancy rate, increasing the home's surplus. Homes have an incentive to expand nursing care costs up to the allowable limit. This is likely to increase both the quality of care and the surplus. Given that the intent of Minnesota regulation is to assure quality across nursing homes, the intensity of use of nursing inputs, in general, is likely to capture quality differences between nursing homes.

THE BEHAVIORAL MODEL

There is evidence that persistent performance differences by ownership type imply different organizational goals (Bradley & Walker, 1998; Luksetich et al., 1992; Wolff & Schlesinger, 1998). Hoerger (1991) showed that for-profit and nonprofit organizations respond differently to changes in exogenous variables, implying different objective functions. Hansmann (1981) argued that how nonprofit institutions in the performing arts spend their discretionary funds reveals their goals. By similar reasoning, the spending of any surplus earned by an organization reveals its objective function. Finally, if performance by ownership type converges over time, either competition or regulation enforces conformity, making ownership form mute.

Our major purpose is to investigate behavioral differences across organizational forms of nursing homes. We do this by testing whether the various ownership types perform differently, if they respond differently to changes in regulations, and if they differ in how they distribute their surplus.

The model we develop here relates nursing home spending on resident care, administrative expenses, and capacity usage to ownership type and chain affiliation for the years 1984 to 1991. Regulation changes in 1988 allowed for increased nursing care spending. Estimating the model before and after 1988 clarifies whether the regulation change modified behavior and whether behavioral changes differed across organizational form. Finally, we estimate how the earned surplus varies across different types of homes and how this surplus is spent. We estimate this model with data from the *Annual Cost Reports for Long-Term Care Facilities* (Department of Human Services, State of Minnesota, 1984-1991) for the years 1984 to 1991.

Our behavioral model relates five endogenous variables: the efficiency incentive, general and administrative expenses per resident day, nursing care expenses per resident day, total resident days, and owners' compensation. We assume that for-profit firms attempt to maximize their surplus (the product of efficiency incentive and total resident days). Firms control their surplus by increasing the efficiency incentive and/or the number of resident days. The efficiency incentive is based on the previous year's reported costs, so profit

maximization in the current year requires that a home maximize its resident days. Resident days can be increased by either expanding marketing activity (involving higher general and administrative expenses) or by increasing perceived quality—nursing services, for example. Consequently, our behavioral model posits three simultaneously determined endogenous variables: the number of resident days, general and administrative expenses per resident day, and nursing care costs per resident day. The efficiency incentive is predetermined because it depends largely on the previous year's noncare operating costs. Because owners are residual claimants, their compensation is determined after the three simultaneously determined variables. The formal model follows:

Equation 1

$$E_t = E(C_{t-1}, N_{t-1}, R_{t-1}, P_{t-1}, t, L)$$

relates the efficiency incentive in time t, (E_t) to the lagged per resident day noncare operating costs (C_{t-1}). We include lagged nursing expenses (N_{t-1}), lagged real estate rate (R_{t-1}), and lagged property rate (P_{t-1}) in the equation for three reasons. With the efficiency incentive, they determine the basic rate a nursing home can charge its residents. Second, if regulation is efficient, these costs should not affect the efficiency incentive. If these coefficients are statistically significant, the regulations could generate unintended effects. Finally, although the efficiency incentive is independent of nursing expenses, we include the lagged nursing expenses to determine if changes in allowable nursing expenses in 1988 affected the incentives that firms faced. Dummy variables for time (t) are included in each of the five equations to discern the temporal stability of the results and lessen the effect of autocorrelation. Finally, both location dummy variables (L) are included to reflect differences in allowable costs. Homes in areas classified as either rural or metropolitan have higher allowable costs than the homes in areas classified as deep rural, the control group.

In Equation 2

$$N_t = N(T_t, Ch_t, A_t, D_t, CM_t, S_t, TS_t, TCS_t, t, new_t, F, L)$$

we hypothesize that nursing and other care-related operating costs recoverable in rates (N_t) are determined by ownership type (T_t) and chain affiliation (Ch_t).[2] General and administrative expenses (A_t) may affect nursing costs in one of two ways. A positive relation indicates that these two inputs are complements in nursing care. A negative relation would imply that administrative inputs substitute for nursing care and may indicate expense-preference behavior. Because of this potentially ambiguous effect, the predicted administrative and general expenses are included in the nursing expense equation. Total predicted resident days (D_t) and its squared term indicate the extent of economies of scale in average nursing care costs. If nursing homes maximize output at the expense of care quality, we would expect resident days and care ex-

penses to be negatively related. Case mix (CM_t) and its squared value allow a nonlinear effect of the intensity of care on average nursing care costs.

Nursing costs that are positively related to the predicted surplus ($S_t = E_tD_t$) would indicate quality maximization. Two interaction terms, the product of the type of home and the predicted surplus (TS_t) and the product of chain affiliation and the predicted surplus (TCS_t), indicate how various ownership types distribute their surplus. Comparing the coefficients on these variables in the nursing expense equation with their coefficients in the administrative expense and the resident day equations reveal organizational goals.

A change in ownership ($new_t = 1$) could increase or decrease nursing costs, administrative costs, resident days, or ownership compensation; the sign on this coefficient is indeterminate. The facility type $(F)^3$ and the case mix variables control for nursing care costs due to the primary clientele of the facility. The final variable, the home's location designation (L), will account for input/price-wage differences in the rural and metropolitan areas compared to the deep rural area.

General and administrative expenses (A_t) are a necessary component for profit maximization as well as a necessary input for delivering services to clients. Equation 3

$$A_t = A(T_t, Ch_t, N_t, D_t, S_t, TS_t, TCS_t, t, new_t, Sqft, L)$$

predicts that general and administrative expenses are a function of ownership type (T_t) and chain affiliation (Ch_t). Administrative costs will change with ownership type if the objective functions of the organizations differ. Persistently higher expenses by a particular organizational type (e.g., chain affiliates) may indicate expense-preference behavior or agency problems.

Equation 3 also includes the predicted values of nursing costs (N_t), resident days (D_t), and squared resident days. Nursing and administration can be complementary inputs; close supervision may increase nursing productivity. Expense-preference behavior, however, may create a trade-off between the two; administrative staff may displace nursing staff. The resident day variables are alternative measures of the facility's scale of operation. A negative relationship between resident days and general and administrative expenses per patient day indicates economies of scale; a positive relation points to diseconomies of scale.

The predicted surplus (S_t) and the two interaction terms between the surplus and ownership form track expense-preference behavior. If surpluses increase administrative costs, then administrators may be padding their budgets at the expense of owners (for-profits) or the quality of care (not-for-profits). These terms also track organizational goals and differentiate the distribution of the surplus by organizational type.

The annual dummy variables (t) test for shifts in the function over time. The dummy variable for ownership change ($new_t = 1$) proxies the effects of learning by doing; changes in ownership will require more managerial inputs per

resident. The measures of facility size, square feet (Sqft), and its squared term are included to measure economies or diseconomies of scale in nursing home operations and to determine the optimal facility size. Location (L) allows for differences in general and administrative expenses by geographic designation.

The number of resident days results from the supply and demand for nursing home care. Therefore, the resident day equation, Equation 4

$$D_t = D(T_t, Ch_t, N_t, A_t, S_t, TS_t, TCS_t, B_t, t, new_t, L,)$$

contains the ownership type (T_t) and chain affiliation (Ch_t), both of which proxy organizational goals that may affect product quality and supply. Demand side factors depend primarily on perceived quality of care, which is best proxied by average nursing expenditures (N_t). General and administrative inputs (A_t) are important is maintaining a smooth running operation. We expect a positive coefficient on A_t; a negative coefficient implies that homes substitute bureaucracy for the quantity of care offered.

The relation between the predicted surplus (S_t) and resident days and their interaction terms reveals the importance of size to the organization. The primary supply variable is the number of beds approved on January 1 of a particular year, (B_t). The time (t) variable controls for changes in demand from 1985 to 1991, and change of ownership (new_t) controls for the effects of ownership changes on resident days. Location (L) controls for supply and demand differences by geographic designation.

The owners' compensation equation is Equation 5

$$O_t = O(Ch_t, N_t, A_t, S_t, TCS_t, C_t, t, new_t, L) .$$

Because only for-profit firms can distribute the surplus to owners, this equation is estimated only for the approximately 180 for-profit nursing homes. If chain membership causes agency problems, chain affiliation should reduce owners' compensation. If chains pay owners more, perhaps the chains are more technically efficient.

Because owners are the residual claimants, owners' compensation is a function of actual expenses instead of predicted expenses. Both average nursing expenses (N_t) and average general and administration expenses (A_t) are included to test for input inefficiencies. A zero coefficient on these variables is consistent with optimal behavior because these inputs should be increased until their marginal effect on owners' compensation is neither positive nor negative. A positive coefficient implies an under-usage of the input; a negative coefficient implies that the firm uses the input beyond the point where owners' compensation is maximized.

Owners' compensation depends most directly on the surplus (S_t). The coefficient for the actual surplus (S_t), the efficiency incentive multiplied by the actual resident days, should be positive because of the owners' claim on the

surplus. A significant negative coefficient on the interaction term between surplus and chain affiliation (CS_t) implies agency problems. Because the efficiency incentive is earned by reducing the noncare operating costs (C_t), this cost variable is also included. If noncare outlays are optimal, this coefficient should be zero. However, if homes that incur greater average noncare operating costs pay higher compensation, it would appear that other homes are skimping too much on noncare inputs. Homes that appear less attractive capture fewer resident days and a lower surplus.

Time (t) is included as explained earlier. Owners of new homes (new_t) probably receive lower compensation as they work their way up the learning curve. The coefficients on the location variables (L) would underline any differences in compensation due to geographic designation.

EMPIRICAL RESULTS[4]

Tables 1 to 5 contain the estimates of our model. To test for the impact of the regulatory changes introduced in 1988, we estimate equations for all years, then reestimate them for 1985 to 1987 and 1988 to 1991.[5] First, we focus on the major variables in the efficiency incentive equation. Second, we center on the hypothesis that ownership type and chain affiliation affect spending patterns and behavior. Third, we investigate the different ways that firms distribute their surplus. Fourth, we look at the interaction between nursing spending, administrative and general spending, and resident days. We finish with a brief discussion of control variables.

Table 1 contains the regression results for the efficiency incentive. The most important explanatory variable in this equation is noncare operating costs per resident day. By economizing on noncare operating costs, a firm increases the efficiency incentive. The intent of the regulation is to decrease these costs. The regulation is effective in this regard. One less dollar spent on noncare operating costs per resident day increases the following year's efficiency incentive by 11 cents.

If the regulation is efficient, the coefficients on the nursing care costs, the real estate tax payment rate, and the property payment rate would be approximately zero. This is not the case. Each of these three variables becomes significantly different from zero after the 1988 regulations went into effect. Before 1988, average nursing costs had no impact on the efficiency incentive; with 1988's regulatory change, an extra dollar of nursing expense per resident day is estimated to increase the following year's efficiency incentive by 2.3 cents. After 1988, each $1 increase in the real estate tax payment rate increases the efficiency incentive by approximately 7.2 cents. Each $1 decrease in the lagged property payment rate now increases the efficiency incentive by about 1.2 cents.

Table 1.   Efficiency Incentive

	Pre 1988 (n = 1,230)		1988 and Later (n = 1,640)		Full Sample (n = 2,870)	
Lagged other operating costs per day	–0.112***	(–14.885)	–0.110***	(–17.457)	–0.108***	(–22.527)
Lagged nursing care costs per day	0.005	(0.52376)	0.023***	(3.052)	0.014**	(2.396)
Lagged real estate tax payment rate	–0.041	(–1.119)	0.0712***	(3.319)	0.037*	(1.895)
Lagged property payment rate	0.005	(0.712)	–0.012*	(–1.804)	–0.004	(–0.853)
D86	–0.182***	(–4.283)			–0.187***	(–4.909)
D87	–0.013	(–0.300)			–0.021	(–0.550)
D88					–0.069*	(–1.799)
D89			–0.084**	(–2.454)	–0.147***	(–3.778)
D90			–0.154***	(–4.389)	–0.212***	(–5.389)
D91			–0.202***	(–5.696)	–0.258***	(–6.481)
Rural designation	0.032	(0.684)	0.059*	(1.789)	0.045	(1.607)
Metropolitan designation	0.399***	(7.398)	0.197***	(5.446)	0.272***	(8.844)
Constant	2.194***	(23.576)	1.951***	(28.155)	2.082***	(34.082)
R^2 adjusted	0.266		0.251		0.255	
Sum of squared errors	446.95		389.15		843.13	

*Implies 10% confidence level. **Implies 5% confidence level. ***Implies 1% confidence level.

PERFORMANCE DIFFERENCES
BY OWNERSHIP FORM

The results presented in Tables 2 through 4 show that performance varies by ownership form. We find substantial, persistent spending differences on average nursing care due both to ownership types and chain affiliation.

For the 1985 to 1991 period and for each of the subperiods, not-for-profit homes spent more on nursing care than did the for-profit homes. Assuming that for-profits maximize their surplus, the greater nursing care expenses of the not for-profits reflect bonoficing behavior. Similarly, the not for profits also spent less for general and administrative expenses per resident day and operated with significantly fewer resident days than did the independent for-profit facilities.

Except for the for-profit homes belonging to Minnesota chains, chain-affiliated nursing homes consistently spent less on nursing care than the independent homes of the same type. For example, nonprofit homes belonging to either a Minnesota or national chain spent less on nursing care costs than did their independent, religiously affiliated counterparts. The Minnesota chains and for-profit national chains demonstrated a convergence over time to the amount of average nursing expenses incurred by their control groups. However, nonprofit homes belonging to national chains not only were spending

Table 2. Nursing Care Costs Per Day
Second Stage Estimates With Cross-Product Profit Terms and Predicted Surplus

	Pre 1988 (n = 1,230)		1988 and Later (n = 1,640)		Full Sample (n = 2,870)	
Religious	3.639***	(8.340)	3.263***	(9.724)	3.287***	(12.808)
Government	4.223***	(9.692)	3.358***	(11.074)	3.506***	(14.678)
Secular	4.020***	(8.607)	2.885***	(9.177)	3.237***	(12.831)
Minnesota chain, religious	–0.918**	(–1.981)	–0.556*	(–1.761)	–0.477*	(–1.882)
Minnesota chain, secular	–6.396***	(–6.051)	–0.322	(–0.912)	–1.311***	(–4.050)
Minnesota chain, for profit	0.570	(1.620)	–0.069	(–0.219)	0.221	(0.960)
National chain, religious	–2.100***	(–3.754)	–1.572***	(–4.366)	–1.678***	(–5.626)
National chain, secular	–1.068*	(–1.970)	–2.782***	(–3.761)	–1.476***	(–3.609)
National chain, for profit	–1.153***	(–3.376)	–0.590**	(–2.115)	–0.865***	(–4.058)
Predicted surplus	0.00002***	(4.525)	0.25E-04***	(5.504)	0.23E-04***	(6.814)
Religious	–0.24E-05	(–0.445)	–0.56E-05	(–0.989)	–0.30E-05	(–0.785)
Government × predicted surplus	–0.16E-04*	(–1.646)	–0.28E-04***	(–3.238)	–0.21E-04***	(–3.232)
Secular × predicted surplus	–0.25E-04***	(–2.818)	–0.31E-04***	(–3.604)	–0.28E-04*	(–4.582)
Minnesota chain, religious × predicted surplus	–0.16E-04	(–1.432)	0.96E-06	(0.141)	–0.62E-05	(–1.102)
Minnesota chain, secular × predicted surplus	0.16E-04	(0.919)	0.13E-04	(1.053)	0.16E-04	(1.569)
Minnesota chain, for profit × predicted surplus	–0.13E-04	(–1.640)	–0.15E-05	(–0.203)	–0.70E-05	(–1.349)
National chain, religious × predicted surplus	–0.59E-05	(–0.589)	–0.19E-05	(–0.266)	–0.41E-05	(–0.712)
National chain, secular × predicted surplus	0.37E-04**	(2.154)	0.59E-04***	(2.553)	0.42E-04***	(3.251)
National chain, for profit × predicted surplus	–0.66E-05	(–0.874)	–0.95E-05*	(–1.685)	–0.87E-05*	(–1.929)
Predicted administrative and general expenses	2.802***	(10.327)	2.331***	(13.017)	2.473***	(16.765)
Predicted resident days	0.28E-04***	(2.785)	0.15E-04**	(2.126)	0.18E-04***	(3.108)
(Predicted resident days)^2	–0.17E-09**	(–2.466)	–0.53E-10	(–1.184)	–0.78E-10*	(–2.052)
D86	–0.513***	(–3.174)			–0.526***	(–3.648)
D87	–0.554***	(–3.328)			–0.645***	(–4.416)
D88					–0.395***	(–2.678)
D89			0.198	(1.476)	–0.142	(–0.945)
D90			0.542***	(4.039)	0.236	(1.530)
D91			0.774***	(5.387)	0.394**	(2.488)
New	–0.004	(–0.010)	–0.031	(–0.099)	–0.271	(–1.122)
Hospital–attached	–3.558***	(–5.963)	–2.611***	(–7.241)	–2.866***	(–9.319)
Intermediate care facility 1	–0.190	(–1.205)	–0.228**	(–1.997)	–0.225*	(–2.437)
Intermediate care facility 2	–0.024	(–0.113)	–0.290*	(–1.841)	–0.175	(–1.353)
Board and care facility	0.336	(0.594)	0.358	(1.071)	0.314	(1.055)
Board and lodging facility	0.678	(1.397)	0.203	(0.654)	0.285	(1.063)
Skilled nursing facility	–0.024	(–0.103)	–0.329	(–1.636)	–0.271*	(–1.767)
Case mix	7.735***	(5.797)	4.831***	(3.928)	7.045***	(7.725)

(continued)

Table 2   Continued

	Pre 1988 (n = 1,230)		1988 and Later (n = 1,640)		Full Sample (n = 2,870)	
(Case mix)^2	–2.228***	(–6.420)	–1.440***	(–4.684)	–1.971***	(–8.533)
Rural designation	–0.345*	(–1.756)	–0.123	(–0.972)	–0.190*	(–1.694)
Metropolitan designation	0.198	(0.602)	0.271	(1.222)	0.287	(1.552)
Constant	–6.758***	(–3.442)	–2.174	(–1.346)	–4.645***	(–3.712)
R^2 adjusted	0.441		0.494		0.463	
Sum of squared errors	6,122.6		5,434.2		1,1791	

*Implies 10% confidence level. **Implies 5% confidence level. ***Implies 1% confidence level.

less on average nursing care, their spending seems to be diverging from the amount spent by the independents.

As shown in Table 2, after 1987, the secular independent homes spent $2.88 more than the control group on average nursing care costs. Secular homes affiliated with national chains spend $2.78 less than independents. These facilities, therefore, spent only 10 cents more on average nursing care costs than the independent for-profit homes. Before 1988, these same facilities spend $2.95 ($4.02 to $1.07) more than the control group.

For-profit homes belonging to national chains spent nearly 64 cents more per resident day on administration than did independent for profits or for profits belonging to a Minnesota chain (see Table 3). This suggests an agency problem: Owners of homes in national chains have less control over administrators, who in turn secure a greater share of the home's revenue for themselves. Chain affiliation increased general and administrative expenses for religiously affiliated homes and secular nonprofits belonging to local chains, also implying agency problems. Similar to the spending on nursing care, the average amount paid for administrative and general expenses by secular nonprofit and for-profit chains is converging to the amount spent by the control group. This is not true for religiously affiliated chains.

Finally, we can discern no difference in owners' compensation for the for-profit homes belonging to Minnesota chains and the independent for-profit facilities. Owners of for-profit homes belonging to national chains received a lower amount of compensation than the other two groups.

DISTRIBUTION OF SURPLUS
BY OWNERSHIP TYPE

The larger the predicted surplus, the greater the spending for nursing care and for general and administrative purposes. Total resident days also increase as the surplus increases. This holds for all ownership types. Among the for-profit homes, owners' compensation increases as the actual surplus increases.

Table 3. General and Administrative Expenses
Second Stage Estimates With Cross-Product Profit Terms and Predicted Surplus

	Pre 1988 (n = 1,230)		*1988 and Later* (n = 1,640)		*Full Sample* (n = 2,870)	
Religious	–0.917***	(–5.325)	–1.353***	(–7.463)	–1.234***	(–9.944)
Government	–0.998***	(–6.023)	–0.855***	(–5.119)	–1.020***	(–8.556)
Secular	–0.623***	(–3.414)	–0.702***	(–3.823)	–0.756***	(–5.747)
Minnesota chain, religious	0.531**	(2.376)	0.424**	(2.248)	0.462***	(3.281)
Minnesota chain, secular	3.155***	(7.518)	0.246	(1.167)	0.648***	(3.580)
Minnesota chain, for profit	–0.317*	(–1.689)	0.077	(0.428)	–0.184	(–1.419)
National chain, religious	0.417	(1.541)	0.553***	(2.890)	0.456***	(3.027)
National chain, secular	–0.435	(–1.514)	–0.045	(–0.101)	–0.218	(–0.937)
National chain, for profit	0.958***	(5.270)	0.417***	(2.762)	0.640***	(5.517)
Predicted surplus	0.12E-04***	(4.766)	0.14E-04***	(5.936)	0.12E-04***	(6.859)
Religious	–0.15E-05	(–0.475)	–0.50E-06	(–0.157)	–0.49E-07	(–0.022)
Government × predicted surplus	–0.78E-05	(–1.515)	–0.46E-05	(–0.897)	–0.32E-05	(–0.871)
Secular × predicted surplus	–0.79E-05	(–1.620)	–0.74E-05	(–1.470)	–0.63E-05*	(–1.773)
Minnesota chain, religious × predicted surplus	0.28E-05	(0.480)	0.18E-06	(0.045)	–0.85E-06	(–0.268)
Minnesota chain, secular × predicted surplus	–0.28E-04***	(–2.925)	0.23E-05	(0.324)	–0.31E-05	(–0.555)
Minnesota chain, for profit × predicted surplus	0.52E-05	(1.229)	–0.16E-05	(–0.379)	0.38E-05	(1.281)
National chain, religious × predicted surplus	–0.14E-05	(–0.263)	–0.11E-05	(–0.262)	–0.44E-06	(–0.136)
National chain, secular × predicted surplus	0.17E-04*	(1.850)	0.39E-04***	(2.774)	0.25E-04***	(3.453)
National chain, for profit × predicted surplus	0.68E-06	(0.168)	0.27E-05	(0.846)	0.25E-05	(0.975)
Predicted nursing care costs per day	0.868***	(20.945)	0.864***	(25.835)	0.890***	(32.779)
Predicted resident days	–0.18E-04***	(–2.894)	–0.32E-04***	(–10.201)	–0.31E-04***	(–8.388)
(Predicted resident days)^2	0.19E-10	(0.451)	0.61E-10*	(1.914)	0.45E-10*	(1.737)
D86	0.537***	(6.118)			0.549***	(6.656)
D87	0.496***	(5.635)			0.542***	(6.563)
D88					0.415***	(5.024)
D89			–0.259***	(–3.199)	0.129	(1.553)
D90			–0.389***	(–4.807)	–0.002	(–0.022)
D91			–0.372***	(–4.705)	0.013	(0.161)
New	0.151	(0.723)	0.071	(0.385)	0.150	(1.102)
Square feet	–0.35E-04***	(–7.282)	–0.11E-04***	(–4.047)	–0.19E-04***	(–6.989)
(Square feet)^2	0.12E-09***	(7.013)	0.62E-10***	(6.742)	0.74E-10***	(7.765)
Rural designation	–0.003	(–0.032)	–0.046	(–0.602)	–0.030	(–0.486)
Metropolitan designation	–1.370***	(–8.784)	–1.199***	(–9.926)	–1.321***	(–13.433)
Constant	–4.897***	(–10.346)	–4.677***	(–13.677)	–5.191***	(–16.777)
R^2 adjusted	0.468		0.481		0.467	
Sum of squared errors	1,753.3		1,953.7		3,802.3	

*Implies 10% confidence level. **Implies 5% confidence level. ***Implies 1% confidence level.

**Table 4. Resident Days Second Stage
Estimates With Cross-Product Profit Terms and Predicted Surplus**

	Pre 1988 (n = 1,230)		*1988 and Later* (n = 1,640)		*Full Sample* (n = 2,870)	
Religious	–4,206.5***	(–4.058)	–8,297.8***	(–6.930)	–6,836.3***	(–8.377)
Government	–5,926.7***	(–6.394)	–7,512.5***	(–7.550)	–7,383.0***	(–10.583)
Secular	–1,087.4	(–1.150)	–2,209.1**	(–2.109)	–2,174.9***	(–3.034)
Minnesota chain, religious	5,342.0***	(4.625)	3,523.8***	(3.441)	4,206.2***	(5.603)
Minnesota chain, secular	20,612.***	(9.381)	–1,115.3	(–0.988)	3,018.4***	(3.155)
Minnesota chain, for profit	–702.51	(–0.747)	425.69	(0.444)	–160.14	(–0.240)
National chain, religious	1,697.0	(1.213)	2,123.9**	(2.004)	1,837.0*	(2.255)
National chain, secular	–1,754.3	(–1.195)	7,666.4***	(3.162)	761.09	(0.621)
National chain, for profit	3,861.7***	(3.903)	944.26	(1.133)	2,855.2***	(4.469)
Predicted surplus	0.069***	(6.603)	0.083***	(6.978)	0.086***	(10.795)
Religious	0.035**	(2.405)	0.051***	(2.883)	0.043***	(3.792)
Government × predicted surplus	0.007	(0.290)	0.018	(0.646)	0.019	(1.045)
Secular × predicted surplus	–0.085***	(–3.623)	–0.103***	(–3.873)	–0.088***	(–5.000)
Minnesota chain, religious × predicted surplus	–0.019	(–0.625)	–0.044**	(2.026)	–0.043***	(–2.590)
Minnesota chain, secular × predicted surplus	–0.084*	(–1.751)	0.058	(1.515)	0.005	(0.178)
Minnesota chain, for profit × predicted surplus	–0.069***	(–3.415)	–0.047**	(–2.128)	–0.056***	(–3.752)
National chain, religious × predicted surplus	–0.004	(–0.132)	–0.034	(–1.528)	–0.017	(–0.987)
National chain, secular × predicted surplus	0.060	(1.290)	–0.012	(–0.161)	0.062	(1.606)
National chain, for profit × predicted surplus	–0.031	(–1.556)	0.008	(0.492)	–0.009	(–0.694)
Predicted nursing care costs per resident day	3,531.1***	(11.040)	5,915.7***	(15.843)	5234.3***	(19.085)
Predicted general and administrative expenses	–5,509.4***	(–13.235)	–7,480.4***	(–16.789)	–6,804.6***	(–20.531)
D86	2,080.1***	(4.392)			3,048.1***	(6.655)
D87	1,720.7***	(3.565)			2,948.4***	(6.334)
D88					2,115.8***	(4.698)
D89			–1,711.0***	(–3.860)	343.74	(0.782)
D90			–2,629.0***	(–5.721)	–561.74	(–1.284)
D91			–2,761.9***	(6.210)	–402.77	(–0.934)
New	–2963.8***	(–2.793)	–4,063.2***	(–4.126)	–2,768.4***	(–3.846)
Number of beds: January 1	,273.47***	(58.036)	258.14***	(55.787)	259.63***	(74.041)
Rural designation	–207.37	(–0.414)	–920.50**	(–2.231)	–655.03**	(–2.041)
Metropolitan designation	–1,923.0**	(–2.343)	–5,511.7***	(–7.113)	–4,626.0***	(–7.757)
Constant	–12,565.***	(–5.441)	–28,434***	(–11.733)	–26,083.***	(–13.582)
R^2 adjusted	0.920		0.926		0.922	
Sum of squared errors	0.46E+11		0.57E+11		0.11E+12	

*Implies 10% confidence level. **Implies 5% confidence level. ***Implies 1% confidence level.

Although for-profit homes tend to spend less on nursing care than the not-for-profit homes, they spend a greater portion of their surplus on nursing

Table 5. Owners' Compensation With Cross-Product Profit Terms and Actual Surplus

	Pre 1988 (n = 490)		1988 and Later (n = 636)		Full Sample (n = 1,126)	
Minnesota chain, for profit	–7,922.4	(–1.278)	5,901.3	(1.244)	–2,928.6	(–0.768)
National chain, for profit	–24,935***	(–4.211)	–14,875***	(–3.547)	–19,728***	(–5.679)
Actual surplus	0.517***	(8.716)	0.619***	(13.437)	0.577***	(15.575)
Minnesota chain, for profit × surplus	–0.025	(–0.187)	–0.383***	(–3.562)	–0.163*	(–1.898)
National chain, for profit × surplus	–0.385***	(–2.965)	–0.451***	(5.416)	–0.422***	(–5.768)
Nursing care costs per day	–319.54	(–0.237)	–1,501.2*	(–1.847)	–971.55	(–1.314)
Administrative and general expenses	6,325.3***	(3.835)	–2,120.1	(–1.448)	2,963.4***	(2.707)
Other operating costs per day	623.05	(0.460)	5,852.0***	(6.246)	3,487.7***	(4.350)
D86	104.91	(0.024)			685.50	(0.182)
D87	–6,627.7	(–1.468)			–5,144.8	(–1.354)
D88					–5,564.0	(–1.437)
D89			3,860.3	(1.182)	–3,470.8	(–0.868)
D90			1,474.9	(0.454)	–4,691.0	(–1.175)
D91			3,392.7	(1.018)	–3,030.8	(–0.740)
New	–18,867.**	(–2.243)	–11,330.*	(–1.814)	–13,517.***	(–2.608)
Rural designation	–6,246.0	(–1.002)	–10,573.***	(–2.747)	–8,074.8**	(–2.316)
Metropolitan designation	–7,902.4	(–1.021)	–16,828.***	(–3.583)	–14,001.***	(–3.302)
Constant	–3,291.9	(–0.192)	–25,895.***	(–2.385)	–18,627.*	(–1.854)
R^2 adjusted	0.276		0.330		0.292	
Sum of squared errors	0.74E+12		0.49E+12		0.13E+13	

*Implies 10% confidence level. **Implies 5% confidence level. ***Implies 1% confidence level.

care than did government-operated and secular nursing homes. Moreover, secular national chains spend significantly more out of surplus for average nursing costs than the independent for-profit homes. Three groups of homes spend significantly less out of surplus on nursing care than others: independent secular homes, secular homes belonging to Minnesota chains, and government-operated facilities.

The propensity to spend on administrative inputs out of the earned surplus mirrors spending for nursing care out of surplus. Secular nonprofit homes belonging to national chains spend approximately three times more out of their surplus on general and administrative expenses than nursing homes in general. This reflects expense-preference behavior, agency problems, or both.

Religiously affiliated homes generate more resident days per dollar of surplus than the independent for-profit homes. Resident days for secular homes are inversely related to the surplus. Belonging to a Minnesota chain also reduces the propensity to spend surplus on resident days for religious and for-profit homes.

After 1987, the share of the surplus going to owners of independent for-profit homes generally increased. However, the share of the surplus going to owners of chain-affiliated for-profit homes dramatically declined in the later

period. In general, however, no systematic relation between the allocation of the surplus and ownership or organization type appears.

PRODUCTION AND INPUT RELATIONSHIPS
OF MINNESOTA NURSING HOME INDUSTRY

The production and input expenses largely confirm the complementarity of nursing inputs with general and administrative inputs. The estimates from Table 3 show that each extra dollar of nursing expenses generates $0.89 in additional administrative expenses. Average nursing costs increase with resident days, although before 1988, they increased at a declining rate. Average administrative costs declined with resident days prior to 1988. After 1988, average administrative costs declined until resident days reached 263,000 (720 full-time equivalents), then increased.

Before 1988, spending by the for-profit firms on nursing inputs appears to be optimal. Since 1988, each dollar of nursing expenses per resident day reduces owners' compensation by $1,501, implying either bonoficing behavior or nonoptimal spending for nursing care by for-profit homes. By contrast, before 1988, each extra dollar of general and administrative expenses increased owners' compensation by $6,325, implying that these expenses may have been suboptimal. Since 1988, the derivative of owners' compensation with respect to these expenses is effectively zero, implying optimal spending in this area.

EFFECTS OF TIME, OWNERSHIP CHANGE,
AND CONTROL VARIABLES

The efficiency incentive declined in real terms between 1985 and 1986, remained constant between 1986 and 1988, then declined each year through 1991. Because the amount of the efficiency incentive (a maximum of $2 per patient day) has remained unchanged since 1984, this decline is to be expected.

The average spending on nursing care consistently decreases from 1985 until the new regulations in 1988. Two years following the imposition of the new regulations, average nursing care expenditures approach their 1984 values, becoming significantly greater in 1991. General and administrative costs increase in 1985 and 1986 by more than 50 cents per resident per day. After the 1988 regulatory change, the administrative costs are no longer different from 1984 levels. The resident days also increase between 1985 and 1987, but after the 1988 change, resident days fall to their 1984 levels. None of the temporal variables are significant in the owners' compensation equation, implying that owners' compensation tends to keep pace with the medical costs. Given that medical costs have been rising at twice the rate as the general consumer price index, real owner compensation has actually been rising.

Ownership change has no discernible effect on average nursing care costs or general and administrative expenses. Ownership change is inversely related to total patient days, and that relationship is getting stronger over time. As expected, owners of homes that change ownership receive significantly less in total compensation than do homes with a continuity of ownership.

The effect of the noncare operating costs on owners' compensation provides insight into the behavior of for-profit nursing homes. Before 1988, additional expenditure on noncare operating costs had no significant impact on owners' compensation—owners appear to have optimized these expenses. In 1988, regulation changed to encourage greater nursing spending. This regulation change led nursing homes to substitute nursing expenditures for noncare operating costs. As a consequence, the change in owners' compensation when noncare operating costs change becomes positive and statistically significant, whereas the coefficient on average nursing expenses becomes negative and significant. It appears that the substitution of nursing expenses for noncare operating expenses reduced owners' compensation.

DISCUSSION

Theory implies that nonprofit institutions exist because of informational asymmetries between producers and consumers. Not-for-profit firms signal potential clients a disinclination to exploit the client's information deficiencies. By investigating the performance of for-profit and not-for-profit firms coexisting in the same market, we gain insights into whether this signaling is effective.

Organizational form affects nursing home performance in Minnesota. We find that for-profit homes are more interested in maximizing their surplus, whereas not for-profits tend to maximize the quality of patient care. We also find that diverse types of nursing homes respond differently to changes in regulations. Secular Minnesota chains spend less on nursing care and more on administrative expenses and generate more residence days after the change in the regulatory regime. Residence days for secular chains become significantly greater than the for-profit homes (the control group) after 1988. Apparently, the change in regulation accelerated the growth and expense preference behavior for these chains.

We assume that the distribution of earned surplus indicates the goals of nursing homes. As expected, most of the surplus of independent for-profit homes goes to the owners. For-profit homes belonging to chains tend to divert more of their surplus into administration.

For-profit nursing homes are the most diligent in controlling the noncare operating costs that result in a greater efficiency incentive. All not-for-profit homes tend to spend more per resident day on nursing care than do the for

profits—a reflection of bonoficing behavior. Chain membership for nonprofits generally results in less spending in this area. Homes belonging to chains behave more like for-profits than do their nonchain cohorts.

More than the others, the nursing home chains seem to reflect the organizational form that Hansmann (1980) warned is merely a cover for proprietary activity, in spite of the stringent regulatory environment in Minnesota. We found that chains, regardless of their ownership type, had lower nursing care costs per patient day and higher general and administrative expenses per patient day. It is questionable whether chain affiliates have any scale or scope advantages over independently run homes.

These results reinforce other studies addressing the issue of whether nursing home chains provide cost advantages. Meiners' (1982) examination of 1,147 nursing homes found no chain economies. Arling, Nordquist, and Capitaman (1987) found nursing home chains in Virginia had lower per patient operating costs. McKay (1991) found mixed results. She found that chains were more efficient than for-profit independents at intermediate and high levels of output and less efficient at lower output levels. Fizel and Nunnikhoven (1993) identified significant multiplant economies in nursing chains. All of these studies used total costs per patient day.

Minnesota nursing home regulations are designed to approximate uniformity in behavior. Within a range, costs are recoverable in the rates charged. The efficiency incentive encourages all types of nursing homes to economize on nonessential inputs and to free up resources, thus furthering the organization's goal. The effect of the efficiency incentive is to enhance the benefits of diversity. Regulators wanting to increase options available to the public without sacrificing care quality could explore the potential afforded by the efficiency incentive to achieve this goal.

In any event, the behavioral differences we observe are not surprising. If bonoficing behavior is the socially preferred outcome, then encouragement of not-for-profit nursing homes should be the goal of public policy. If efficiency is the goal, then profit maximizers are best.

Chain affiliation blunts the distinction between the for-profit and not-for-profit homes. It results in the for-profit homes earning lower profits and the not-for-profit homes engaging in less bonoficing. In short, chain affiliation encourages expense-preference behavior and leads policy makers to seriously question whether chains of nonprofit nursing homes are using the tax advantages for the nonprofits as cover for what is really a proprietary activity. Clearly more research regarding the effects of chain affiliation on nursing home behavior is needed.

POLICY IMPLICATIONS AND LIMITATIONS

This article deals with the unique incentives embodied in the efficiency incentive of Minnesota nursing home regulations. By allowing the not-for-

profit homes to earn a surplus over their costs, we have been able to verify that differences in the behavior of for-profit and not-for-profit nursing homes stem not from tax considerations but from more basic differences in goals. Our analysis shows that the efficiency incentive seems to work; all forms of nursing homes react to the possibility of a surplus by reducing noncare expenses. Other states may wish to implement similar incentives. On the other hand, we find no evidence that chains are more efficient. In fact, they appear to increase expense-preference behavior. This issue is most relevant to policy makers within the nursing homes themselves. Neither patients nor owners seem to benefit from chain affiliation.

Hansmann (1980) classified nonprofits and noted that there are likely to be important behavioral differences between the various organizational forms of nonprofits. We find that there are important behavioral differences even within the different categories. The behavioral differences within categories depend largely on whether nursing homes are chain affiliated. We speculated earlier a stringent regulatory environment, such as exists in Minnesota, may be needed to assure a uniform quality of care across organizational form. Our results show that important behavioral differences continue to exist even in such an environment.

Because of the uniqueness of Minnesota regulations, some of our findings may reflect other unique characteristics of this one state's nursing home industry. If other states imitate Minnesota's regulation regime, it may be possible to perform the multistate study that should be the next step in this investigation.

Notes

1. This study is available on request.

2. T_t = ownership type. The control group is for-profit homes not affiliated with a chain. Other ownership types are religiously affiliated not for profits and secular not for profits. Ch_t = chain affiliation. The reference group is independent homes. Other types are Minnesota chains and national chains for religious, secular, and for-profit nursing homes.

3. F is the set of dummy variables for facility type. Senior residence facility (minimal medical care) is the reference group. Other facility types are: intermediate care facility Type 1, intermediate care facility Type 2, board and care facility, board and lodging facility, skilled nursing facility, and hospital attached facility.

4. We use ordinary least squares (OLS) rather than a pooled technique so that we can more easily perform the necessary statistical tests with annual dummy variables. The pooled technique is inefficient in both testing for structural change before and after 1988 and accounting for individual annual variations within the same model. Pooling techniques rectify both autocorrelation and heteroskedasticity. Our annual dummy variables should alleviate problems from autocorrelation. To adjust for heteroskedasticity, we tried estimating the equations using White's (1980) heteroskedastic-consistent covariance matrix estimation procedure to correct for an unknown form of heteroskedasticity. The coefficients were identical, and their significance levels were the same as the OLS results. We report the OLS results. All expenditure variables are deflated using the consumer price index for medical services (1982 = 100). First-stage equations are estimated by ordinary least squares. We derive the predicted values of average nursing costs, general and

administrative expenses per resident day, and total resident days to estimate the structural equations.

5. In our model, the efficiency incentive is assumed to be predetermined. Nursing care costs, general and administrative expenses, and residence days are determined simultaneously. This simultaneity necessitates the use of two-stage least squares. The owners' compensation derives from the other four equations, allowing us to employ ordinary least squares to estimate this equation. The first stage regression predicts the nursing care costs, general and administrative expenses, and residence days. The predicted values of those variables are used in the second stage regressions. A discussion and presentation of the first-stage results are available from the authors on request.

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