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# The McNerney Forum

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## Ownership Form and Consumer Welfare: Evidence from the Nursing Home Industry

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*This paper compares the likely consumer benefits of higher quality with the potentially greater production costs that result from increased not-for-profit activity in a nursing home services market area. The comparison of consumer benefits and costs is made possible by observing empirically how an increased market penetration of not-for-profit facilities affects the use of private-pay nursing home care. Increased (decreased) use of nursing home care suggests that the consumer benefits associated with additional not-for-profit nursing homes are greater (less) than consumer costs. The empirical results indicate that, from a consumer's perspective, too few not-for-profit nursing homes may exist in the typical market area of the United States. The policy implication is that more quality of care per dollar might be obtained by attracting a greater percentage of not-for-profit nursing homes into many market areas.*

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As is the case with many other health care industries, organizations with different ownership forms characterize the nursing home industry in the United States. National estimates indicate that 66% of all nursing homes are organized on a for-profit basis; private not-for-profits make up another 27% of all nursing homes, and public nursing homes account for the remaining 7% (CMS 2003).<sup>1</sup>

The mixture of ownership forms in the nursing home industry has led to some disagreement among health care analysts and policymakers over which type is better from a societal point of view. One view contends

that all nursing home care should be provided by not-for-profit organizations. The main argument is that for-profit institutions sacrifice quality of care so their owners can earn greater profits. Evidence of inferior care in for-profit nursing homes often is cited in support of this contention. Himmelstein and Woolhandler (2004, p. 1) summarize this position well within the context of hospital services by noting that “investor-owned health care embodies a new value system that eradicates any vestige of the community roots and Samaritan traditions of hospitals, makes doctors and nurses into instruments of investors, and views patients as commodities.”

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The contrarian view, however, maintains that all nursing home care should be delivered in a for-profit setting. For-profit medicine is argued to encourage entrepreneurship, innovation, and lower costs of providing nursing home care. The lure of greater profits provides a powerful incentive for health care providers to satisfy the demands of consumer-patients by offering the best care at the lowest possible price, particularly when markets are sufficiently competitive. Evidence of higher production costs in not-for-profit nursing homes often is used to support this for-profit perspective.

In this paper, we consider a relatively new perspective that argues a mixture of ownership forms in health care industries may serve to balance simultaneously quality and cost concerns. That is, in isolation each type of organization may face an opposite incentive with respect to costs and quality of care. However, the competition among the different ownership types brings about a balancing of costs and quality in line with consumer welfare.

Our paper builds on this perspective by developing and conducting an empirical test to assess whether the typical nursing home market currently possesses the optimal mix of for-profit and not-for-profit organizations from the consumer's perspective. The empirical analysis suggests that not-for-profit nursing homes are under-represented in most market areas of the United States. In the next section, we discuss the theoretical and empirical background on the economics of ownership differences. This discussion is followed by an explanation of how we conduct the empirical test. The fourth section describes the data and sample used in the empirical analysis. The fifth section presents the empirical findings and the sixth offers some policy implications. The paper ends with a summary and some conclusions.

### **Theoretical and Empirical Background on Ownership Differences**

To account for a mixture of ownership forms in health care industries, Arrow (1963) points out that medical care is a complex personal service and considerable uncertainty surrounds quality of care. Uncertainty places

consumers in a vulnerable bargaining position when negotiating with health care providers, particularly when the latter are organized on a for-profit basis and possess relatively more information about quality. The general idea is that imperfectly informed consumers perceive for-profit organizations as possibly skimping on the quality of care they provide because of the financial incentive for-profit providers face to satisfy the demands of residual claimants for maximum profits. This concern is particularly worrisome in the case of non-contractible quality because of measurement and enforcement issues.<sup>2</sup>

In contrast, nonprofit organizations confront "softer" incentives to compromise the quality of care they provide (Glaeser and Shleifer 2001). Nonprofit incentives are blunted because a nonprofit organization is forbidden "from distributing any profits it earns to persons who exercise control over the firm, such as its members, officers, directors, or trustees" (Hansmann 1996, p. 228). This has come to be known as a non-distribution constraint. Nonprofit organizations are legally required to dispense their residual earnings for the express educational, charitable, or religious purposes for which they were formed. For example, nonprofit nursing homes are allowed to use their surplus earnings to enlarge their facilities or provide more services. Thus, the non-distribution constraint implies that nonprofit organizations do not face the same pressure from residual claimants, as for-profits do, to exploit any informational asymmetries that may exist. Instead, the nonprofit designation often serves as a signal that quality of care will not be sacrificed for the sake of profits.<sup>3</sup>

Following this line of reasoning, economic theory suggests that an isolated nonprofit health care organization may offer higher levels of quality than an otherwise comparable for-profit organization. Within the context of nursing home care, empirical studies generally have supported this theory. As Hansmann (1996, p. 241) notes: "Nursing care, in particular, is arguably an industry where the potential for customer exploitation is large and is not always adequately dealt with by regulatory and reputational constraints on for-profit firms."

Representative of the empirical literature, Harrington et al. (2001) use a large sample of nursing facilities for 1998 and examine whether quality of care varies systematically across nursing homes of different ownership structures. As a measure of quality, the authors use the number of deficiencies, as revealed by state inspections, at the nearly 14,000 nursing homes in their sample. According to their results, investor-owned nursing facilities average 5.89 deficiencies per home compared to 4.02 at not-for-profit homes, and 4.12 at public nursing homes. After controlling for other determinants of quality, such as patient case mix, the authors find that a for-profit nursing home is associated with .68 more deficiencies than an otherwise comparable not-for-profit nursing home.

Chou (2002) takes the analysis a step further by comparing the effect of ownership status on the quality of nursing home care in the presence and non-presence of asymmetric information. Chou measures quality of care by mortality and several adverse health outcome measures (decubitus ulcers, dehydration, and urinary tract infection). Asymmetric information is defined to exist when nursing home residents have no spouse or child visiting within a month after admission. Chou argues that nursing home residents are usually frail and disabled; therefore, family members often serve as representatives to monitor or evaluate their quality of care. Chou's empirical findings prove to be very interesting. The results for two of the four quality indicators suggest that not-for-profit nursing homes provide better quality care than for-profits when asymmetric information exists. That is, when the residents lack family members to monitor their services, for-profit nursing homes face less incentive to maintain the quality of care. Chou's empirical results support the theory that for-profit nursing homes practice opportunistic behavior and sacrifice quality of care for more profits when asymmetric information exists.

#### *Property Rights and Principal-Agent Problems*

However, given the possible attenuation of property rights caused by the non-distribution constraint, economists are quick to point out that nonprofit organizations are also

likely to face a more severe principal-agent problem. In particular, the absence of a residual claimant with a financial interest in the organization means that no one individual, or group of individuals, has strong incentives to monitor the behavior of the organization. Therefore, in a nonprofit health care organization, the divergence between the interests of the principal(s) and the agent(s) often leads to the inefficient production and provision of medical care services. This is because unconstrained managers of not-for-profit organizations will be more inclined to pursue personal goals and objectives, which are likely to conflict with minimum cost production, *ceteris paribus*. For example, decision makers in not-for-profit nursing homes may use any residual earnings to pursue the five "Ps" of increased power, prestige, pay, perquisites, and patronage (Santerre and Neun 1993). This type of expense preference behavior is consistent with not-for-profit decision makers and other stakeholders, such as residents and workers, receiving personal utility from higher levels of structural quality, including such things as large staffs, beautiful sunrooms, and plush office accommodations. Quality-enhancing behavior of that kind may improve care, but most certainly results in higher costs and prices (Newhouse 1970). Thus, property rights theory predicts that, in isolation, a nonprofit health care organization produces care at higher costs than an otherwise comparable for-profit organization. It is unclear theoretically if the higher costs are fully justified by any quality of care improvements.<sup>4</sup>

Studies concerning production efficiency in the nursing home industry tend to confirm this prediction of property rights theory. For example, Nyman and Bricker (1989) compare the technical efficiency of not-for-profit and for-profit nursing homes. Technical efficiency exists when a given amount of output is produced with the fewest inputs. The authors use data envelopment analysis to measure technical efficiency and multiple regression analysis to identify the reasons why technical efficiency varies across a sample of Wisconsin nursing homes. Nyman and Bricker's findings indicate that for-profit nursing homes employ 4.5% fewer inputs per patient day than

otherwise comparable not-for-profit homes. The general conclusions of this study have been corroborated by a host of studies including Nyman, Bricker, and Link (1990), Fazel and Nunnikhoven (1992), Chattopadhyay and Heffley (1994), and Rosko et al. (1995).

While theory tends to be unambiguous in predicting that an "isolated" not-for-profit organization produces medical care with higher quality and greater production costs than an otherwise similar for-profit organization, not-for-profit and for-profit organizations rarely operate in isolation. Weisbrod (1988) notes that a mixture of ownership types exists because some people are reasonably informed and find attractive the relatively low prices offered by for-profits. Glaeser and Shleifer (2001) point to for-profits and not-for-profits satisfying heterogeneous demands for quality. Specifically, not-for-profits offer high quality at high prices and for-profits enter the market to fill demands for lower quality.

Grabowski and Hirth (2003) hypothesize that competition among for-profit and not-for-profit organizations benefits society. They predict that competitive spillover effects from not-for-profits lead to a higher quality of care in for-profit nursing homes. In support of their theory, they find empirical evidence indicating that a marginal increase in the not-for-profit market share improves for-profit, and overall, nursing home quality. Moreover, Grabowski and Hirth, and much earlier Tuckman and Chang (1988), note that competitive spillovers from for-profits may influence the behavior of not-for-profit nursing homes. In particular, they argue that competition from for-profit organizations limits the production inefficiency of not-for-profits. Production inefficiency is limited because not-for-profits have to be more concerned with the costs of producing medical care when facing competition from the more cost-conscious for-profit organizations.<sup>5</sup> Tuckman and Chang show empirically that competition from for-profits lowers not-for-profit nursing homes' spending on services provided. Grabowski and Hirth conclude that, "if non-profits have a competitive advantage in trustworthiness while for-profits

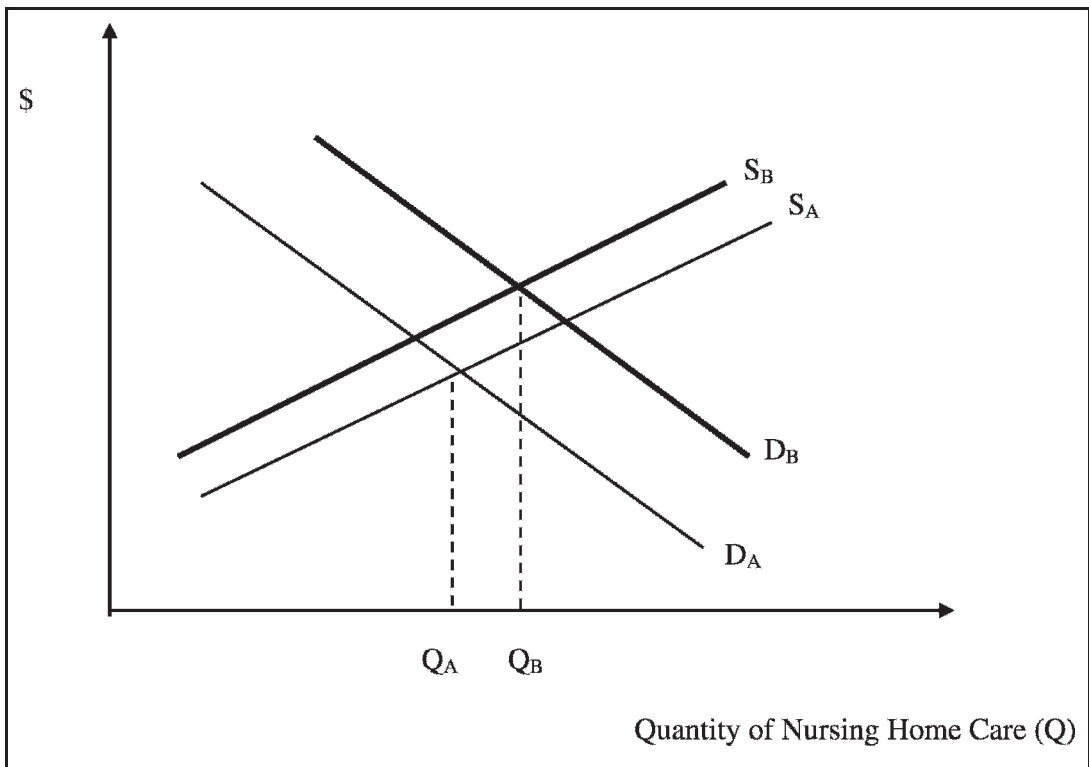
have greater incentives for efficiency, intersectoral competition can yield better outcomes than a market consisting exclusively of one type of firm," (p. 19).

It should be clear from the previous discussion that the theoretical literature regarding ownership differences has evolved considerably over time. The most recent perspective is that a mixture of ownership forms may serve to balance both quality and cost concerns in health care organizations. Missing from this literature, however, is an empirical analysis to determine whether the optimal mix of not-for-profit and for-profit nursing homes currently exists in the typical market area. Public policy might change the mixture if the empirical analysis finds that one type of ownership is under-represented from a consumer or societal perspective. The theoretical basis of our empirical analysis is presented in the following section.

### **Conceptual Model Behind the Empirical Test**

Svorney (1987) provides the underlying model used to test the consumer welfare implications of the mix of for-profit and not-for-profit nursing homes in a geographical market. She examines the role of professional interests in establishing physician licensure. Svorney notes that physician licensure potentially raises costs through higher wages because it acts as an entry barrier, but, she emphasizes, it also may provide greater benefits in the form of quality assurance. The ultimate test of the efficiency of professional licensure, she argues, depends on whether the favorable demand response outweighs the undesirable supply response. For example, if the benefit of quality assurance causes demand to increase (i.e., shift the demand curve to the right) more than higher wages cause supply to decrease (i.e., shift the supply curve to the left), then the utilization of physician services increases, and this reflects the net benefit that physician licensure offers.<sup>6</sup> Hence, one may observe the impact of a regulation (or type of institution) on the use of a particular good or service, and from that draw an inference about its effect on welfare.

The consumer welfare implications of a *mix* of health care organizations with different



**Figure 1.** Illustration of the possible impact of not-for-profit organizations in a market area (the assumption is that market A is dominated by for-profit institutions and market B is characterized by an equal share of for-profit and not-for-profit facilities)

ownership forms can be analyzed in a similar manner. For example, and in the context of our research, suppose we are comparing two similar nursing home markets that differ in the following respect: for-profit facilities completely dominate market area “A,” whereas an equal distribution of market shares across for-profit and not-for-profit facilities characterizes market area “B.” Figure 1 presents a graphic exposition of this comparison for a competitive marketplace.

It should be noted at the onset that the initial conditions in Figure 1 are completely hypothetical; however, they are based on the stylized facts, presented previously, that isolated not-for-profit nursing homes produce care with higher quality because of the non-distribution constraint, but also may incur greater expenses because of the lack of a property rights incentive. We simply are advancing an empirical test that allows comparison of the benefits of any greater quality of care to the potentially higher costs

of production in not-for-profit nursing homes. In fact, if ownership mix does not matter in terms of quality of care and costs of production, then the empirical test will reveal that the two markets do not differ as discussed later.

In Figure 1, the curves  $D_A$  and  $S_A$  represent the demand for and supply of nursing home care in market A, where for-profit facilities completely dominate. Similarly, the curves  $D_B$  and  $S_B$  represent the demand and supply for nursing home care in area B, where both for-profit and not-for-profit nursing homes equally share the market. Notice that  $Q_A$  and  $Q_B$  measure the market-clearing quantity of nursing home care in markets A and B, respectively.<sup>7</sup>

Given the different ownership mixes, the two markets may differ in two principle respects, *ceteris paribus*. First, a greater demand for nursing home care may exist in market area B because of the increased quality assurance resulting, directly or indirectly,

through competitive spillover effects from the greater prevalence of not-for-profit nursing homes. The demand curve in market area B also may be greater because of quality-maximizing behavior in not-for-profit nursing homes. The greater quality (both actual and perceived) is captured by demand curve  $D_B$  in Figure 1. Finally, the demand for nursing home care may be greater in market area B if consumers value variety, which a mixture of for-profit and not-for-profit nursing homes provides (Glaeser and Shleifer 2001). In all of these cases, the greater demand reflects that residents, who otherwise would have remained in their own homes and received either formal or informal home care services, now are attracted to the nursing home marketplace because of the higher quality or variety that is offered due to the increased percentage of not-for-profit nursing homes.

Second, the supply of nursing home care may be lower in area B because of the higher production costs that result from the diminished property-rights incentives, which in turn are due to a greater percentage of not-for-profit nursing homes operating in the market. In addition, market B may have a lower supply of nursing home care because of the higher costs associated with producing better quality. Higher production costs are reflected in supply curve  $S_B$  in Figure 1. However, we cannot overlook that not-for-profit nursing homes are exempted from paying corporate income, property, and sales taxes. To the extent that tax exemptions lower the variable costs of production, they lead to an increased supply of nursing home care in market B. Because the demand (quality) effect is assumed to be stronger than the cost effect in our example as drawn in Figure 1, the equilibrium quantity of nursing home care,  $Q_B$ , is greater in market B than market A. This suggests that an increase in the not-for-profit market share provides more benefits than costs at the margin. In contrast, if the supply reduction outweighs the demand increase, then the quantity of nursing home care will be lower, indicating that the cost of an increase in the not-for-profit market share is greater than the benefit at the margin. That is, the benefit of higher quality does not compensate for the greater costs.

For this analysis, it is not necessary that prices be equal across for-profit and not-for-profit providers. The general idea is that, because of competitive spillovers, a greater percentage of not-for-profit (or for-profit) nursing homes has the potential of influencing both the average price and utilization rate of nursing home care in a marketplace. It is still likely that some consumers who value lower prices will accept low quality, while others who value high quality will pay more dearly. But given that for-profits may skimp on quality because of the economic incentive to do so when consumers are uninformed, having a greater percentage of not-for-profits in a market puts pressure on for-profits to raise their level of quality. That is, although some consumers may be willing to pay for higher quality, for-profits can make even greater profits by reducing quality below the perceived level in the face of asymmetric information when not-for-profits are less dominant. An increased presence of not-for-profits reduces the likelihood that for-profits sacrifice quality for higher profits.

Similarly, a greater percentage of for-profits in a market creates incentives for not-for-profit nursing homes to mind the financial bottom line more diligently. Not-for-profit nursing homes will be unable to compete if their prices are not justified by their quality offerings because they are maximizing organizational slack, for example. This potential balancing of market costs and benefits that a mixture of for-profits and not-for-profits brings to the market results in a more efficient amount of nursing home care compared to a market where for-profit or not-for-profit nursing homes operate solely or dominate the market. In short, the competitive spillovers from the different ownership types result in a better overall balancing of costs and benefits in the marketplace.

Thus, the analysis suggests that we can examine the impact of ownership mix on utilization to infer its consumer welfare implications. More specifically, the test can be conducted by observing the impact that the not-for-profit (or for-profit) market share has on nursing home utilization, while carefully controlling for a host of other supply and demand factors. This approach of focusing on

utilization, as a gauge of consumer welfare, offers two advantages to the researcher.

First, assuming all other factors are held constant, marginal changes in utilization reflect how consumer benefits from any quality adjustments compare to any concomitant changes in consumer prices that result from adjustments in not-for-profit activity. Consequently, the net benefit associated with any change in quality can be inferred from the empirical analysis. Given the difficulty of directly measuring the consumer benefits and costs of quality improvements in practice, indirect inference is particularly attractive and valuable. Second, data for quality are unnecessary to perform this test. As Glaeser and Shleifer (2001, p. 107) note: "Even when markets are divided between for-profit and non-profit firms, it will be difficult to distinguish empirically between the quality of their output. The reason is that both types of firms may well produce output of the same contractible quality, but non-profit firms would choose higher non-contractible quality. To the extent that non-contractible quality is hard to put in a contract and verify in court, it may also be difficult for an econometrician to measure."

Equation 1 represents the general reduced-form model used in the forthcoming statistical estimations. In equation 1,  $Q_i$  represents the equilibrium quantity of nursing home care in market  $i$ ;  $NPS_i$  represents the market share held by not-for-profit nursing homes in market  $i$ ;  $D_{ij}$  is a vector of  $j$  additional variables that are expected to influence the demand for nursing home care in market  $i$ ; and  $S_{ik}$  is a vector of  $k$  additional variables hypothesized to affect the supply of nursing home care in market  $i$ . The error term,  $\mu_i$ , is assumed, for now, to be independent and normally distributed with constant variance and a mean of zero (constant terms and/or fixed effects in equation 1 have been suppressed for algebraic convenience).

$$Q_i = \beta_1 NPS_i + \sum_{n=1}^j \gamma_n D_{in} + \sum_{n=1}^k \gamma_{j+n} S_{in} + \mu_i \quad (1)$$

The sign of  $\beta_1$ , the coefficient estimate on the ownership mix variable, indicates whether

not-for-profit nursing homes are over- or under-represented from a consumer's perspective. If  $\beta_1 > 0$ , then a marginal increase in the not-for-profit nursing home market share generates more consumer benefits than costs at the margin. Hence, not-for-profit organizations are under-represented from a consumer's perspective. Conversely, if  $\beta_1 < 0$ , then increased not-for-profit penetration produces more costs than benefits to consumers.

Of course, we cannot rule out the possibility that demand or supply effects may not occur in practice. For example, consumers may not value the signaling and/or better quality offered by not-for-profits. If so, the supply effect solely determines the influence of the ownership mix on consumer welfare. Another possibility is that ownership mix does not matter at all to consumers. For example, for-profit and not-for-profit nursing homes may satisfy entirely different demands for quality, and cross-price effects across the two submarkets may be absent. If that is the case, the empirical results will show a statistically insignificant relation between the ownership mix variable and utilization. However, a statistically insignificant relation also may indicate that the observed ownership mix maximizes consumer welfare (i.e., marginal benefit equals marginal cost). The empirical results will be inconclusive in that case.

It should be noted that we are not alone in using quantity adjustments as a barometer of consumer welfare in the health care industry. For example, Abraham, Gaynor, and Vogt (2005) use quantity information to view how the market entry of new hospitals affects consumer welfare. They find that entry of the second and third firms increases quantity, which allows them to infer that market entry increases consumer welfare in the hospital services industry. Santerre and Vernon (2006) use information on the use of various types of hospital services to infer how ownership mix affects consumer welfare. They find that from a consumer perspective, nonprofit hospitals are over-represented in the inpatient sector, whereas for-profit hospitals are over-represented in the outpatient sector of the typical hospital services market.

**Table 1. Descriptive statistics**

Variables	Mean	S.D. <sup>a</sup>	Source
Private-pay residents per 10,000 elderly population	195	204	1995–1996 Online Survey, Certification and Reporting (OSCAR)
Medicaid residents per 10,000 elderly population	453	741	OSCAR
Public nursing home share (in terms of beds)	.045	.022	OSCAR
Log of population	10.45	1.31	2003 Area Resource File (ARF)
Population density	240	1,053	ARF
Log of median county income	9.86	.21	ARF
Female divorce rate (interpolated 1990, 2000)	.09	.020	ARF
Female unemployment rate (interpolated 1990, 2000)	.058	.027	ARF
Proportion of population that is white	.84	.180	ARF
Percent of population in poverty (1997)	14.90	6.11	ARF
Log of CMS wage index	9.01	.141	Centers for Medicare and Medicaid Services (CMS)
Proportion of pop. 65 and older (interpolated 1990, 2000)	.148	.042	ARF
Proportion of pop. 85 and older as a fraction of percent elderly (interpolated 1990, 2000)	.12	.046	ARF
Fraction of patients receiving skilled care	.30	.196	OSCAR
Fraction of nursing homes belonging to a chain	.52	.335	OSCAR
Herfindahl-Hirschmann index of market concentration (HHI)	.45	.317	OSCAR
Doctors per 10,000 population	12.25	14.17	ARF
Hospitals per capita	.63	.81	ARF
Nursing homes per 10,000 population	1.39	1.47	OSCAR
Proportion of hospitals with nursing beds	.176	.265	OSCAR
Presence of a certificate-of-need (CON) law	.725	.447	Harrington et al. 1998
Presence of a moratorium	.350	.477	Harrington et al. 1998
Log of average Medicaid price	4.37	.192	Harrington et al. 1998
Hospital paid differently	.140	.347	Harrington et al. 1998
Retrospective reimbursement	.028	.164	Harrington et al. 1998
Combination	.102	.303	Harrington et al. 1998
Adjusted reimbursement	.480	.500	Harrington et al. 1998
Case-mix reimbursement	.556	.497	Harrington et al. 1998
Flat rate reimbursement	.088	.283	Harrington et al. 1998
Market share of not-for-profit nursing homes (in terms of beds)	23.96	30.36	OSCAR
Proportion of not-for-profit hospital days in 1986	.466	.448	American Hospital Association
Change in poverty 1991 to 1997	–.922	8.03	ARF

<sup>a</sup>S.D. = Standard deviation.

**Data and Empirical Test**

Data were gathered for each of the 2,939 nursing home markets in the United States to implement our ownership-welfare test. Because of missing data, 2,573 market observations were used in the empirical analysis. In our test, the county is assumed to be a reasonable approximation of the relevant geographical market for nursing home care. Previous studies support the county as a proxy for the relevant geographical market in the nursing

home industry (e.g., Nyman 1994; Cohen and Spector 1996; Grabowski and Hirth 2003; Gulley and Santerre 2003). The data used in our empirical analysis are for the year 1996, or as close to that year as possible, and come from four different sources. Table 1 reports the mean value, standard deviation, and data source for each of the variables used in our empirical analysis.

The conceptual model indicates that a measure of nursing home care utilization, or

quantity,  $Q_i$ , is necessary to conduct the empirical test. Because our analysis, as reflected in Figure 1, assumes flexible prices, we measure utilization with two variables. The first measure is the number of private-pay nursing home residents divided by the number of people age 65 years and older in each county. This allows us to control for the size of the market across observations.

For comparative purposes, we also examine how not-for-profit market penetration influences the use of nursing home care by Medicaid recipients. Hence, our second measure of utilization is the number of Medicaid residents per 10,000 elderly people in the county. Nursing homes are reimbursed at an administered rate by state governments when providing care to Medicaid residents. The impact of greater not-for-profit market penetration on the use of nursing home services by Medicaid recipients is unclear a priori, and depends on the net effect of three influences.

First, as a Scanlon (1980) type dual-market model predicts, Medicaid residents may be squeezed out of nursing home beds if private demand grows because of greater quality offered by not-for-profit nursing homes, assuming the Medicaid reimbursement rate remains constant. Second, that same model predicts that higher quality-induced marginal costs result in fewer nursing home services supplied to Medicaid recipients for a given Medicaid reimbursement rate. These first two influences suggest that increased not-for-profit penetration leads to less use of nursing home care by Medicaid recipients, all other factors held constant.<sup>8</sup>

However, Medicaid recipients personally face a zero out-of-pocket price, so they essentially “vote with their feet” when choosing among nursing home care and other alternatives, such as home health care. As a result, any change in nursing home care use by Medicaid recipients reflects only their demand effect and not any personal cost effect resulting from increased not-for-profit activity. This “vote with their feet” mechanism conflicts with the two prior influences because it implies that greater not-for-profit penetration increases the use of nursing home care by Medicaid beneficiaries. The potential magnitude of this third influence depends on:

1) how much excess capacity exists in the industry at the prevailing Medicaid reimbursement rate and; 2) the number of Medicaid-eligible individuals relative to the number already receiving nursing home services in the market area.

As previously mentioned, in an effort to isolate the impact of ownership mix on consumer welfare, we also must control for any other factors that might result in utilization differences across market areas. Otherwise, the omission of variables that are correlated with both ownership mix and the number of residents could lead us to draw incorrect inferences from our empirical results. Following the conceptual model, these other influences are broken down into the aforementioned demand-side variables,  $D_j$ , and supply-side variables,  $S_k$ . The demand-side variables affecting use of nursing home care include: public nursing home share, population (in natural logs), population density, the median income (in natural logs), the poverty rate, the percentage of the population age 65 years and older, the ratio of the population age 85 years and older to the population age 65 years and older, the percentage of the population that is white, the percentage of the female population unemployed, the percentage of the female population divorced, and the number of doctors and hospitals per capita.<sup>9</sup>

These demand-side variables are intended to control for differences in the willingness and ability to purchase nursing home care across market areas. Except for a few, the rationale for including most of these demand-side variables should be self-evident. The female unemployment and divorce rates are intended to capture the availability of informal care outside nursing facilities. The number of doctors and hospitals per capita serve to capture potential referral sources. Given that the market share of public nursing homes is relatively low and has been relatively constant over time (at about 6% from 1986 to 2005), it is assumed to be exogenously determined. That is, local and state fiscal policies likely influence the availability of public nursing home beds more than market forces. Hansmann (1987) assumes an exogenous public market share in his study of the

determinants of the not-for-profit nursing home share in different areas of the United States over time.

The supply-side variables are intended to capture relative differences in the costs of providing, and the willingness to offer, nursing home care across the various market areas. As such, they include: the Centers for Medicare and Medicaid Services (CMS) area wage index (in natural logs), the number of nursing homes per capita, the Herfindahl-Hirschman index (HHI) of the market concentration of nursing homes, and the percentage of nursing homes that are hospital based or belong to a chain. We also control for the presence of certificate of need laws (CON), the existence of a moratorium on nursing home construction, and the type and generosity of Medicaid reimbursement at the state level.<sup>10</sup> In another specification, these important state policy variables are replaced by state fixed effects.

The primary focus of our paper is the impact of ownership mix on consumer welfare in the nursing home industry. We use the aggregate market share of not-for-profit nursing homes in each market to identify varying degrees of competitive spillovers in various nursing home markets. Theoretically, the market share of not-for-profit nursing homes may be endogenous. For example, residents may be drawn to not-for-profit nursing homes because managers set aside extra beds in pursuit of the personal utility derived from operating larger organizations (Newhouse 1970). In addition, David (2003), Glaeser and Shleifer (2001), and Lakdawalla and Philipson (1998) develop models in which organizations choose the form of ownership that provides benefits in excess of costs. Consequently, theory dictates that we test whether the not-for-profit share can be treated as exogenous.

Following Grabowski and Hirth (2003), the not-for-profit share of *hospital* beds in 1986 is one of the instruments used in the test of exogeneity. In their study, Grabowski and Hirth make a compelling theoretical and empirical case for this particular instrument.<sup>11</sup> They argue that the lagged value of the not-for-profit hospital market share serves as a plausible instrument because it

captures those areas that historically have been more favorable for the development of not-for-profit health care organizations. In addition, the relative share of not-for-profits in different parts of the country may be deeply rooted in historical factors, such as a city's age, and different patterns of voluntarism and charitable provision that have little to do with the advanced technology and prevalence of third-party payment that characterize the current health care environment. Grabowski and Hirth's statistical analysis provides strong support for the suitability of the lagged not-for-profit hospital market share as an instrument.

The change in the poverty rate between 1991 and 1997 in each county serves as our second instrumental variable. Hansmann (1987, 1996), among others, argues that for-profit organizations are better able to react to changes in demand given that they are more entrepreneurial than not-for-profits. In addition, not-for-profits are relatively locked in to their existing capital because of legal barriers to raising equity capital. As a result, for-profit nursing homes exit markets where poverty is rising and enter markets where poverty is falling, with the not-for-profit market shares adjusting accordingly. Moreover, a commitment to servicing areas where poverty is worsening over time may agree with the charitable mission of a not-for-profit nursing home, giving them reason to stay when for-profits are leaving. For these two reasons, the market share of not-for-profit nursing homes is likely to be higher in market areas in which poverty increases over time.

The two first-stage regression models are estimated by the Tobit procedure. The Tobit procedure considers that the dependent variable (not-for-profit share) is left- and right-censored at 0% and 100%, respectively. The first-stage multiple regression results are reported in Tables 2 and 3. Table 2 shows the results with state policy variables such as CON laws and Medicaid reimbursement levels specified, and Table 3 displays the results with state fixed effects. As expected, the coefficient estimates are positive and statistically significant on both of the instruments in the two equations. According to the regression results, the not-for-profit nursing

**Table 2. Multiple regression results for not-for-profit market share with state policy variables**

Variable	Coefficient	Std. error	z-statistic	Probability
Constant	10.261	90.880	.113	.910
Change in poverty rate	.748	.198	3.788	.000
Not-for-profit hospital share in 1986	20.136	2.396	8.405	.000
Public share	1.249	.717	1.742	.082
Log of population	8.523	1.831	4.655	.000
Density	9.93E-05	.0004	.260	.795
Log of income	-1.824	7.643	-.239	.811
Female divorce rate	-146.101	58.099	-2.515	.012
Female unemployment rate	-58.771	56.413	-1.042	.298
Proportion of pop. that is white	7.104	7.701	.923	.356
Poverty rate	-.605	.244	-2.473	.013
Proportion elderly	59.687	28.411	2.101	.036
Proportion elderly 85 and older	275.100	66.410	4.142	.000
Log of CMS area wage	-20.812	10.239	-2.0326	.042
Fraction skilled care	-6.636	6.169	-1.076	.282
Fraction of nursing homes in chain	-1.762	3.972	-.443	.657
HHI	48.063	7.462	6.441	.000
Doctors per 10,000	.150	.057	2.635	.008
Hospitals per capita	-1.747	2.492	-.701	.483
Nursing homes per capita	.974	.689	1.413	.158
Proportion of hospital-based nursing homes	26.685	6.083	4.386	.000
CON law	-6.778	2.411	-2.811	.005
Moratorium	2.765	1.989	1.390	.165
Log of Medicaid price	7.878	5.529	1.425	.154
Hospital paid differently	-2.554	3.03	-.842	.400
Retrospective reimbursement	-3.704	7.582	-.488	.625
Combination	-3.590	2.799	-1.283	.200
Adjusted reimbursement	-1.039	2.000	-.519	.604
Case-mix reimbursement	2.487	2.000	1.244	.214
Flat rate	7.782	3.477	2.238	.025

Notes: The adjusted  $R^2$  of the equation is .365.

The coefficients are Tobit estimates.

Heteroskedasticity-consistent standard errors are shown.

Sample size is 2,573 counties in the United States.

Regional fixed effects are also specified.

home share is greater in those market areas where the poverty rate has increased over the previous six years and where not-for-profit *hospitals* traditionally have dominated. For later purposes, it is important to note that the regression findings in Table 2 suggest a lower not-for-profit nursing home market share in counties where a state CON law exists.

Using the approach suggested by Davidson and MacKinnon (1993), we employ the Hausman (1978) test for the exogeneity of the not-for-profit share. The null hypothesis of exogeneity is rejected by the Hausman test and we therefore examine the relationship between the not-for-profit share and each of our two measures of utilization using the two-stage least squares (TSLS) procedure.

## Empirical Results

Four multiple regression results are reported in Tables 4 through 7. Tables 4 and 5 summarize the findings for private-pay utilization with the state policy variables and state fixed effects, respectively. Tables 6 and 7 show the results for similar regression specifications for Medicaid use. The reported standard errors are made heteroskedastic-consistent.

In Tables 4 and 5, the regression results reveal that the independent variables explain a sizable proportion of the variation in use of private-pay nursing home care across the various counties of the United States. The findings in the two tables are fairly similar except that the results in Table 4 offer some

**Table 3. Multiple regression results for not-for-profit market share with state fixed effects**

Variable	Coefficient	Std. error	z-statistic	Probability
Constant	-85.087	112.995	-.753	.451
Change in poverty rate	.986	.256	3.850	.000
Not-for profit hospital share in 1986	20.849	2.654	7.855	.000
Public share	1.546	.750	2.060	.039
Log of population	6.477	2.098	3.088	.002
Density	.001	.001	.974	.330
Log of income	-10.774	8.498	-1.268	.205
Female divorce rate	-87.672	76.825	-1.141	.254
Female unemployment rate	12.605	55.075	.229	.819
Proportion of pop. that is white	-9.055	9.767	-.927	.354
Poverty rate	-.877	.328	-2.671	.008
Proportion elderly	71.798	35.752	2.008	.045
Proportion elderly 85 and older	317.304	83.327	3.808	.000
Log of CMS area wage	7.862	12.603	.624	.533
Fraction skilled care	.626	7.527	.083	.934
Fraction of nursing homes in chain	-5.962	4.353	-1.370	.171
HHI	1.051	7.697	.137	.891
Doctors per 10,000	.061	.052	1.165	.244
Hospitals per capita	-7.001	2.667	-2.625	.009
Nursing homes per capita	-.288	.911	-.316	.752
Proportion of hospital-based nursing homes	32.112	6.265	5.125	.000

*Notes:* The adjusted  $R^2$  of the equation is .263.  
 The coefficients are Tobit estimates.  
 Heteroskedasticity-consistent standard errors are shown.  
 Sample size is 2,573 counties in the United States.  
 State fixed effects are also specified.

insights into the effect of various state policies on private-pay nursing home utilization. Not surprisingly, both sets of results indicate that private-pay nursing home care is used more extensively in counties with high income and where a greater percentage of the population is white. Also, private-pay utilization is higher in areas where more doctors act as referral sources for nursing home services and where more nursing homes are available.

According to the results in Table 4, private-pay utilization is lower in counties where state CON laws and nursing home construction moratoria exist, although the CON relationship is much weaker. These entry barriers likely produce higher prices, which reduce the quantity demanded of private nursing home care at the extensive margin. In addition, the regression findings imply that private-pay utilization declines with higher Medicaid reimbursement, as the Scanlon (1980) model predicts.

More important for the research at hand is the finding that the coefficient estimates on the not-for-profit market share are positive and statistically significant in both regression

equations. Specifically, the results from the tables suggest that a one-percentage-point increase in the not-for-profit market share results in 1.4 to 2.7 additional private-pay residents per 10,000 elderly individuals in the typical market area. This direct relationship suggests that a marginal increase in not-for-profit nursing home penetration generates more benefits than costs from a private-pay consumer’s perspective.

The results for Medicaid use in Tables 6 and 7 offer a different insight. According to these findings, the not-for-profit share has no statistically significant marginal impact on the number of Medicaid residents at the 5% level or better. This may mean that the direct “voting with the feet” mechanism is offset completely by the private-pay demand increase and the quality-induced cost increase brought on by increased not-for-profit penetration. In any case, the results suggest that Medicaid residents are not adversely affected by a marginal change in the not-for-profit market share.

It is also interesting that the results for the state policy variables in Table 6 reveal that

**Table 4. Multiple regression results for private-pay nursing home care with state policy variables**

Variable	Coefficient	Std. error	t-statistic	Probability
Constant	-374.162	243.099	-1.539	.124
Not-for-profit share	2.467	.436	5.664	.000
Public share	-16.287	4.202	-3.876	.000
Log of population	-21.065	9.660	-2.181	.029
Density	.004	.005	.769	.442
Log of income	107.495	21.513	4.997	.000
Female divorce rate	-561.164	162.215	-3.459	.001
Female unemployment rate	326.111	223.260	1.461	.144
Proportion of pop. that is white	98.335	22.438	4.382	.000
Poverty rate	-.867	.423	-2.050	.041
Proportion elderly	-1,201.905	111.391	-10.790	.000
Proportion elderly 85 and older	163.374	210.491	.776	.438
Log of CMS area wage	-12.011	26.343	-.456	.649
Fraction skilled care	6.831	10.350	.660	.509
Fraction of nursing homes in chain	-9.954	6.373	-1.562	.118
HHI	-36.217	30.801	-1.176	.240
Doctors per 10,000	1.043	.454	2.296	.022
Hospitals per capita	-45.159	11.053	-4.085	.000
Nursing homes per capita	119.300	14.412	8.278	.000
Proportion of hospital-based nursing homes	-29.527	11.453	-2.578	.010
CON law	-8.506	6.103	-1.394	.164
Moratorium	-16.802	4.138	-4.060	.000
Log of Medicaid price	-28.470	14.891	-1.912	.056
Hospital paid differently	-24.837	7.713	-3.220	.001
Retrospective reimbursement	81.858	16.488	4.965	.000
Combination	30.105	14.282	2.108	.035
Adjusted reimbursement	10.116	5.267	1.920	.055
Case-mix reimbursement	-2.531	6.633	-.382	.703
Flat rate	-3.953	7.820	-.506	.613

Notes: The adjusted  $R^2$  of the equation is .723.

The coefficients are two-stage least square estimates.

Heteroskedasticity-consistent standard errors are shown.

Sample size is 2,573 counties in the United States.

Regional fixed effects are also specified.

the presence of CON laws and moratoriums on further nursing home construction benefits Medicaid recipients. The higher prices from these entry barriers may squeeze out private-pay residents and thereby make room for more Medicaid residents in nursing homes. The positive coefficient estimates on the HHI in both tables support this interpretation of the results. That is, the number of Medicaid residents increases with market concentration in the nursing home industry, assuming all other factors remain constant. Alternatively, or simultaneously, CON laws and moratoriums may cause investors to build assisted-living facilities for private-pay individuals. In addition, the increased number of community care agencies during the mid-1990s may have been able to accommodate some of the

private-pay people in states with CON laws. Finally, the regression results imply that the number of Medicaid residents increases with the Medicaid reimbursement rate as the Scanlon model predicts.<sup>12</sup>

### Policy Implications

An important policy implication can be drawn from these findings. According to our regression results, a marginal increase in the not-for-profit nursing home market share above its mean value of 24% produces more consumer benefits than costs. Our data indicate that the market share of not-for-profit nursing homes is below 24% in slightly over 60% of all nursing home markets in the United States. Consequently, not-for-

**Table 5. Multiple regression results for private-pay nursing home care with state fixed effects**

Variable	Coefficient	Std. error	t-statistic	Probability
Constant	59.649	329.113	.181	.856
Not-for-profit share	1.361	.445	3.056	.002
Public share	-17.163	5.067	-3.388	.001
Log of population	-15.464	10.338	-1.496	.135
Density	-.001	.005	-.210	.834
Log of income	115.868	25.288	4.582	.000
Female divorce rate	-691.763	194.921	-3.549	.000
Female unemployment rate	267.474	215.588	1.241	.215
Proportion of pop. that is white	75.481	27.367	2.758	.006
Poverty rate	.218	.443	.491	.624
Proportion elderly	-1,208.504	135.671	-8.908	.000
Proportion elderly 85 and older	45.434	261.267	.174	.862
Log of CMS area wage	-88.591	37.602	-2.356	.019
Fraction skilled care	13.141	12.830	1.024	.306
Fraction of nursing homes in chain	-12.436	6.446	-1.929	.054
HHI	-8.470	31.664	-.267	.789
Doctors per 10,000	1.088	.434	2.510	.012
Hospitals per capita	-39.108	11.953	-3.272	.001
Nursing homes per capita	115.278	18.921	6.093	.000
Proportion of hospital-based nursing homes	-20.153	12.649	-1.593	.111

*Notes:* The adjusted  $R^2$  of the equation is .748. The coefficients are two-stage least square estimates. Heteroskedasticity-consistent standard errors are shown. Sample size is 2,573 counties in the United States. State fixed effects are also specified.

profit nursing homes are significantly under-represented from a consumer’s perspective in most U. S. nursing home markets. It follows from this, therefore, that more quality of care per dollar can be obtained through an increase in the market penetration of not-for-profit organizations in most market areas.<sup>13</sup>

These findings are intriguing because they suggest that for-profit nursing homes may have to be converted to not-for-profit status to improve consumer welfare in many market areas. At the same time, the results are not surprising given the attention paid to allegations of inferior quality of care in the nursing home industry (Institute of Medicine 2001).

One may wonder why a greater mix of not-for-profit organizations has not evolved naturally in the nursing home industry because of normal market forces. Several reasons come to mind. First, regulatory factors such as the presence of CON laws may provide some explanation for the under-allocation of not-for-profit organizations to the nursing home industry. In the context of the hospital services industry, Gulley and

Santerre (1993) find that the for-profit market share is greater in states with certificate of need laws. They argue that for-profit hospitals face a greater incentive to jump the hurdle created by CON laws because of the economic rents generated by that entry barrier. Lakdawalla and Philipson (1998) find empirically that CON laws have led to a larger for-profit share in the nursing home industry for that same reason. Our results in Table 2 are consistent—they show an inverse relation between the presence of CON laws and the not-for-profit market share. Second, as mentioned previously, Hansmann (1987, 1996) argues that compared to for-profit organizations, not-for-profit nursing homes are less mobile because of the inability to raise equity capital. Hence, not-for-profit nursing homes are unable to react to imbalances in supply and demand in the same way, and as quickly, as for-profits often can.

**Conclusion**

This paper offers a test of the welfare implications of the ownership mix in various

**Table 6. Multiple regression results for Medicaid nursing home care with state policy variables**

Variable	Coefficient	Std. error	t-statistic	Probability
Constant	-1,449.064	814.614	-1.779	.075
Not-for-profit share	1.798	1.514	1.188	.235
Public share	-63.963	17.126	-3.735	.000
Log of population	-12.297	29.206	-.421	.674
Density	.008	.017	.456	.649
Log of income	27.211	60.897	.447	.655
Female divorce rate	645.666	452.312	1.427	.154
Female unemployment rate	2,195.035	428.248	5.126	.000
Proportion of pop. that is white	-84.666	65.705	-1.289	.198
Poverty rate	3.124	1.431	2.183	.029
Proportion elderly	-4,756.603	424.427	-11.207	.000
Proportion elderly 85 and older	-5,226.871	899.681	-5.810	.000
Log of CMS area wage	-22.839	75.898	-.301	.764
Fraction skilled care	14.177	32.089	.442	.659
Fraction of nursing homes in chain	45.502	20.503	2.219	.027
HHI	244.232	78.490	3.112	.002
Doctors per 10,000	3.000	.919	3.260	.001
Hospitals per capita	-204.578	36.045	-5.676	.000
Nursing homes per capita	545.239	38.677	14.097	.000
Proportion of hospital-based nursing homes	25.725	38.337	.671	.502
CON law	162.650	21.792	7.464	.000
Moratorium	73.826	13.840	5.334	.000
Log of Medicaid price	567.601	69.087	8.216	.000
Hospital paid differently	-20.213	22.522	-.897	.370
Retrospective reimbursement	-135.055	59.476	-2.271	.023
Combination	73.286	29.125	2.516	.012
Adjusted reimbursement	-82.092	15.874	-5.172	.000
Case-mix reimbursement	-15.609	17.454	-.894	.371
Flat rate	50.157	22.938	2.187	.029

Notes: The adjusted  $R^2$  of the equation is .808.

The coefficients are two-stage least square estimates.

Heteroskedasticity-consistent standard errors are shown.

Sample size is 2,573 counties in the United States.

Regional fixed effects are also specified.

nursing home markets across the United States. When consumers lack sufficient information about nursing home quality, the general notion is that nonprofit organizations generate societal benefits by offering (and signaling) quality assurance. But nonprofits simultaneously may result in higher production costs because of less attention devoted to production efficiency. The opposite scenario is thought to hold for for-profit organizations. Thus, a mixture of ownership types in the marketplace may keep quality and costs under control as a result of competitive spillovers.

In this study, we propose that the welfare implications of the ownership mix might be inferred by using multiple regression analysis

to view how a change in ownership mix affects use, or quantity, of nursing home care. If a small increase in one type of ownership results in greater utilization, then consumer benefits outweigh consumer costs at the margin. Our empirical results suggest that too few not-for-profit nursing homes characterize the typical nursing home market (county) of the United States—at least that was the case in 1996. As a result, more quality of care per dollar could be achieved by encouraging a greater share of not-for-profit nursing homes in most U. S. market areas.

Our empirical finding that not-for-profit nursing homes are under-represented from a consumer welfare perspective is consistent with the relatively low average market share

**Table 7. Multiple regression results for Medicaid nursing home care with state fixed effects**

Variable	Coefficient	Std. error	t-statistic	Probability
Constant	2,476.850	933.121	2.654	.008
Not-for-profit share	2.614	1.548	1.688	.092
Public share	-57.525	16.603	-3.465	.001
Log of population	-12.590	27.677	-.455	.649
Density	.005	.019	.296	.768
Log of income	-48.034	60.607	-.793	.428
Female divorce rate	1,297.276	564.424	2.298	.022
Female unemployment rate	1,615.004	521.414	3.100	.002
Proportion of pop. that is white	-72.770	81.930	-.888	.375
Poverty rate	2.218	1.289	1.72	.086
Proportion elderly	-3,818.228	454.519	-8.401	.000
Proportion elderly 85 and older	-2,801.153	910.741	-3.076	.002
Log of CMS area wage	-125.301	83.806	-1.495	.135
Fraction skilled care	19.079	32.551	.586	.558
Fraction of nursing homes in chain	19.773	18.386	1.075	.282
HHI	190.497	86.691	2.197	.028
Doctors per 10,000	2.750	.900	3.054	.002
Hospitals per capita	-131.488	38.867	-3.383	.001
Nursing homes per capita	445.122	49.736	8.950	.000
Proportion of hospital-based nursing homes	-35.326	36.928	-.957	.339

*Notes:* The adjusted  $R^2$  of the equation is .854.  
 The coefficients are two-stage least square estimates.  
 Sample size is 2,573 counties in the United States.  
 Heteroskedasticity-consistent standard errors are shown.  
 State fixed effects are also specified.

of 24% that can be observed across the various nursing home markets in our sample (in 1996). Schlesinger and Gray (2006) point out that the for-profit dominance among nursing homes seems questionable given the wide disparities in ownership-related quality of care. They contend that “public policy might seek to ensure that the nonprofit market share exceeds 30–40 percent in each community, to capture the spillover benefits involving trustworthy practices” (p. 229). Given that objective, local and state policymakers may want to design incentives to attract a greater percentage of not-for-profit nursing homes in their areas.

It is customarily thought that raising the Medicaid reimbursement rate represents a good mechanism to increase the percentage of not-for-profit nursing homes. However, our empirical findings imply that a higher Medicaid reimbursement rate does not necessarily favor not-for-profit nursing homes. In addition, an increase in the Medicaid reimbursement rate only benefits Medicaid residents. Private-pay residents, because they are squeezed out, are harmed by an increase in the Medicaid rate. Although it may

accomplish other objectives, raising Medicaid reimbursement rates does not provide a solution for the under-allocation of not-for-profit organizations in the nursing home industry.

The literature suggests that not-for-profits are disadvantaged because of their limited access to ready capital and because of CON laws. To provide access to capital, local and state policymakers might want to offer construction bond subsidies to attract a greater percentage of not-for-profit nursing homes into their areas. In addition, government-subsidized financing could be made available for converting for-profit nursing homes to not-for-profit status. CON laws might be used to the advantage of not-for-profit nursing homes by selectively approving only not-for-profits where for-profit nursing homes already have a significant presence. For extreme cases, where the for-profit market share already is well above 60%, a moratorium might be imposed on the construction of new for-profit nursing homes and on the for-profit conversion of existing not-for-profit nursing homes.

## Notes

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- 1 By the term “nonprofit,” we are referring to both private not-for-profit and public organizations.
- 2 Nursing home care examples of non-contractible quality include, but are not limited to, residents receiving constant monitoring, warm smiles, and comforting words from the nursing staff and the timely delivery of hot, nourishing meals from the kitchen help.
- 3 Among the other rationales offered for non-profit health care organizations, Weisbrod (1988) offers externality and equity explanations.
- 4 Notice that the objective function of not-for-profit decision makers is described quite loosely. As the literature suggests, not-for-profits may maximize some combination of quality, quantity, profits, and organizational slack, among other variables (e.g., see the discussion on pages 393 to 401 in Santerre and Neun 2007 in the context of the hospital services industry). It is not our intent in this paper to provide an explicit model of not-for-profit behavior. All that is necessary for our analysis is that not-for-profit nursing homes may pursue different goals than for-profit nursing homes, whatever they might be, but that competitive spillovers between the two types of ownership potentially influence how each actually behaves in the marketplace. The competitive spillovers bring about adjustments in the market utilization of nursing home care through changes in supply and demand. This approach essentially helps us determine whether the higher costs of not-for-profits are because of inefficiency or perquisites, or due to the efficient production of quality at the margin.
- 5 Glaeser (2002) also notes that competition in product markets keeps not-for-profit organizations in line even though their governance structures may be weak.
- 6 Svorney finds empirically that physician licensure leads to a reduced consumption of physician services. That is, physician licensure increased entry costs (supply) by more than it increased consumer benefits from quality assurance (demand). Thus her results provide support for the special interest theory of physician licensure.
- 7 Although the analysis is hypothetical, Gulley and Santerre (2007) find empirically that nursing home prices are higher on average in markets with a greater percentage of not-for-profit nursing homes. They also find that not-for-profit nursing homes, in isolation, charge a higher price than for-profit nursing homes.
- 8 Because of their mission to care for indigent elderly people, religiously affiliated not-for-profit nursing homes may operate with a loss longer than secular not-for-profit nursing homes before reacting to the greater costs of offering higher quality care by adjusting patient mix. But at some point, economic theory suggests that the marginal adjustments should occur even among church-owned homes. Using a sample of California nursing homes, Gulley and Santerre (2007) find that the average church-owned nursing home tends to operate with higher costs but charges roughly the same price as an otherwise similar secular institution. Both the costs and price of a church-owned nursing home are greater than those of the typical for-profit nursing home.
- 9 Population, median income, and the CMS area wage index are specified in natural log form so that all variables are similarly expressed as ratios.
- 10 It is important to note that using county data substantially lessens the potential endogeneity problem normally associated with using data that identify state-level public choices. The presence of a certificate of need law, a moratorium on further construction, and the type and level of Medicaid reimbursement are less likely to be endogenous at the county level than at the state level. Any one county in isolation likely has little impact on the state possessing any of these public policies, except in the case of highly populated areas, perhaps. As a result, we eliminated all counties with population in excess of 100,000. The empirical results remain largely the same.
- 11 Grabowski and Hirth also specify the growth of the elderly population for the 5-year period from 1991 to 1996 as an additional instrument. Given that our dependent variable is the number of residents, this instrument is much less ideal than the lagged nonprofit hospital share. In any case, this variable proved to be statistically insignificant.

12 Although the HHI represents a control variable in the regression analysis and thereby captures the degree of competition, an interaction effect may exist between ownership type and the degree of competition. Santerre and Vernon (2006) faced a similar issue. The concern is that not-for-profits may exploit their pricing power less aggressively in non-competitive markets than for-profits do. If so, comparing equilibrium positions across non-competitive and competitive markets may be problematic. As a result, we re-estimated the equations in Tables 4 and 5 for two different subsamples. One subsample contains only those markets with an HHI below 1,800 ( $n = 539$ ). The other contains those markets with an HHI above 1,800 ( $n = 2,034$ ). The Federal Trade Commission and the Department of Justice treat an HHI in excess of 1,800 as indicating high market concentration. Note that 79% of the market areas in the sample are

highly concentrated according to this definition. The regression results remain largely the same except the coefficient on the not-for-profit share in the private utilization equation is larger in magnitude for the more competitive subsample (4.07 versus 2.23), perhaps indicating a larger utilization effect from the greater prevalence of not-for-profit nursing homes because lower prices are charged on average.

13 In a very early version of this paper, we allowed for a nonlinear relation between the not-for-profit share and the number of private-pay residents to determine a point estimate of the optimal ownership mix. While estimates of the optimal ownership mix of not-for-profits tended to fall within the 40% to 50% range, we questioned their reliability because most of the observations on the not-for-profit share fall below that range and because we were unable to use a two-stage procedure.

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