An Examination of the Presence of Ownership Effects in Mixed Markets

Jeffrey P. Ballou
Northeastern University

Whether consumers perceive for-profit, nonprofit, and government outputs to be perfect substitutes has implications for understanding the social value of nonprofit and governmental producers in the marketplace. While theoretical arguments have been made in support of and against the existence of ownership effects, little empirical research has been conducted to measure their presence. This study examines data from the Wisconsin nursing home industry from 1984 through 1995 and concludes that ownership effects exist, with consumers indicating the greatest preference for nonprofit homes and the least preference for government homes, ceteris paribus. This result is robust to different specifications.

1. Introduction

A multiplicity of competing ownership types characterizes several large industries in the U.S. economy, including hospitals, education, long-term care, day care, and various social services. While traditional for-profit firms sell outputs in all of these industries, a consumer living in a mixed market—in which more than one ownership type competes for business—has the option of buying from either private nonprofit or government producers. The extent to which consumers perceive the outputs of for-profit, nonprofit, and government organizations in these mixed markets to be close substitutes is unclear, however. Simply observing that a market is mixed is insufficient to conclude that ownership type is irrelevant: While perfect substitutability among outputs across ownership types is consistent with the long-term coexistence of multiple types, such an outcome would also prevail if different ownership types were able to establish and successfully defend separate niches in the product space. In this latter scenario, ownership effects—defined here as a systematic consumer preference (or distaste) for the outputs of particular ownership types—are present; in the former they are not. Understanding which explanation is correct would contribute to our understanding of the social value of the availability of nonprofit and government alternatives in the market. This study strives to answer the question of whether measurable ownership effects do indeed exist by examining data from the nursing home industry in Wisconsin.

The Journal of Law, Economics, & Organization, Vol. 21, No. 1,
doi:10.1093/jleo/ewi010
© The Author 2005. Published by Oxford University Press. All rights reserved. For Permissions, please email: journals.permissions@oupjournals.org

Downloaded from https://academic.oup.com/jleo/article-abstract/21/1/228/883711
by DIP.ECONOMIA BIBLIOTECA COGNETTI DE MARTIIS UNIVERSITA STUDI DI TORINO user
on 12 January 2018

For the purposes of this article, I adopt definitions of ownership types that are standard in the literature. The for-profit firm is defined as any member of the set of sole proprietorships, partnerships, and corporations that are subject to federal taxation, in accordance with the Internal Revenue Code; the government firm is any firm that is controlled and operated by a federal, state, or local government; and the nonprofit firm is any organization that is subject to section 501(c)(3) of the Internal Revenue Code. The primary implications of these differences in definition are financial. In recognition of the perceived social value of nonprofit outputs, the federal government does not tax the income that nonprofits earn in the pursuit of their stated missions. Nonprofits are often exempt from local property taxes as well. At the same time, the Internal Revenue Code requires nonprofits to reinvest their profits in their operations; they are not permitted to distribute them to either outside parties (e.g., shareholders) or inside parties (e.g., managers). This stipulation has come to be known as the nondistribution constraint. Thus, while for-profits can finance investment, expansion, and other capital needs through stock offerings, the nondistribution constraint effectively bars nonprofits from participating in the equity markets. Nonprofits are eligible to receive donations, however, which are tax deductible to the donor; these organizations thus have access to an alternative pool of "equity" capital. Moreover, nonprofits have an advantage when financing capital needs out of earnings, which are taxable to for-profits, but not generally taxable to nonprofits.[1] Like the nonprofits, government firms lack access to equity markets, but unlike the nonprofits, they have access to tax revenues to finance operations.

The practical effect of these legal and financial differences on production decisions and outputs is unclear. The lack of access to equity markets may not significantly raise the typical nonprofit's cost of capital above that of a comparable for-profit,[2] and while governments do have broad powers to tax and borrow, the extent to which they can do so will be limited by the preferences of voters. Nevertheless, government firms do appear to face especially soft budget constraints, in that they can lose money in larger quantities and over longer periods of time without exiting the industry than private firms can. As a consequence, government firms have weaker incentives to allocate inputs and resources to their most productive uses than do otherwise comparable private firms (Shleifer, 1998). Moreover, Alchian and Demsetz (1972) contend that nonprofit organizations, as a consequence of the nondistribution constraint, also lack the ability to provide strong incentives to management, and thereby encourage efficient behavior.

Even if the differential financial constraints influence relative efficiency levels and the mix of inputs used by the different ownership types, these

1. A nonprofit may, in fact, realize taxable income if that income is generated by an activity that is unrelated (in the view of the Internal Revenue Service) to its mission.

2. In a study of the hospital industry, Sloan (1988) finds that the weighted-average cost of capital is actually slightly lower for nonprofits than it is for for-profits. I am not aware of any comparable studies of the nursing home industry, which is the industry considered in this article.

Downloaded from https://academic.oup.com/jleo/article-abstract/21/1/228/883711
by DIP.ECONOMIA BIBLIOTECA COGNETTI DE MARTIIS UNIVERSITA STUDI DI TORINO user
on 12 January 2018

differences alone do not necessarily imply that, for example, a nonprofit and an otherwise identical for-profit will produce different outputs. If the outputs of the three different ownership types are perfect substitutes, then one might find it difficult to justify the substantial subsidies and tax revenues that are directed toward nonprofit and government firms, respectively, especially if these ownership types operate less efficiently than for-profits do. If consumers show a systematic preference for outputs that are not for-profit, however—that is, if ownership effects favoring nonprofit and government firms are present—this would suggest that any cost in lost operating efficiency is at least partially compensated by the gain in output variety corresponding to the presence of these ownership types in the market. Indeed, nonprofit and government firms could potentially provide a net increase to welfare by providing outputs that consumers demand and yet for-profit firms cannot profitably produce. Thus a natural approach to studying the substitutability of outputs across ownership types is to analyze consumer demand for those various types within the framework of a differentiated products industry.

While theorists have offered rationales for the existence of ownership effects (discussed in the next section), relatively little research has actually attempted to measure their presence. This article examines data from the Wisconsin nursing home industry, from 1984 through 1995, and asks whether prospective residents value a nursing home's ownership type when deciding which nursing home to enter. This is a natural industry to study in that mixed markets are common.[3] Thus the typical consumer of nursing home care in the state of Wisconsin can choose between two or more different ownership types, even if the consumer's preferences over locations are fairly specific. The analysis focuses on private-payer residents, who are most likely to be able to choose freely among nursing homes, as explained in the fourth section of the article. I estimate three types of models. The first is a conditional logit model with instruments in which the model specification is derived from the underlying utility functions of prospective nursing home residents. The second is a nested logit that permits a more flexible definition of the market. The third is a reduced-form two-stage least squares model that accounts more explicitly for potential differences across ownership types in capacity and nursing home preferences over which residents to admit. The various specifications estimated here consistently yield results that indicate the presence of ownership effects. Specifically, the results suggest that consumers prefer nonprofit nursing homes to for-profit facilities and for-profits to government facilities, all things being equal.

The remainder of the article is organized as follows: Section 2 discusses the role of ownership effects in the context of the mixed market. Section 3 outlines the model and empirical strategy. Section 4 describes the industry and data. Results and discussion follow in Sections 5 and 6, respectively.

3. It is not unusual for more than one ownership type to compete within the same county. Of the 824 county-years in the dataset analyzed in this article, 69.9% are characterized by the presence of two or more ownership types.

Downloaded from https://academic.oup.com/jleo/article-abstract/21/1/228/883711
by DIP.ECONOMIA BIBLIOTECA COGNETTI DE MARTIIS UNIVERSITA STUDI DI TORINO user
on 12 January 2018

2. Ownership Effects and the Mixed Market

Ownership effects exist whenever consumers reveal a systematic preference for the outputs of certain ownership types over those of others. Such effects may exist for one of three different reasons: First, consumers may value ownership type in and of itself. Second, consumers may value ownership type as a signal of nonverifiable product attributes. That is, there may be product differentiation across ownership types along nonverifiable dimensions. Finally, systematic product differentiation in verifiable dimensions may exist across ownership types.

An example of valuing a given ownership type because of itself would be "buying from a nonprofit because it is a nonprofit." In such a case, the product that one buys may be no different from the product that one could buy at a for-profit—and the buyer realizes this—but the buyer may identify with the mission of the nonprofit and desire to support it by buying nonprofit outputs. That is, support for the nonprofit's mission-related activities enters into the buyer's utility function. Implied here is the buyer's belief that the organization will use the proceeds of the output sale to cross-subsidize mission-related activities. This story may be most plausible when small purchases are involved. Thus a buyer may choose to purchase cookies from the Girl Scouts instead of purchasing similar cookies from the supermarket. It is unlikely that this explanation of ownership effects applies to the purchase of nursing home care, however. Nursing home care is a major and, for private payers, expensive decision, and the choice of nursing home will ultimately influence the prospective resident's subsequent quality of life. In such circumstances, it is highly likely that the desire to maximize the resident's physical and emotional health and comfort will dominate any desire to use the purchase of nursing home care as a form of mission support.

An ownership effect may also reflect the value of any signal associated with the corresponding ownership type. Consider the negotiation between a buyer and a seller over the price and quality of an output for which quality is nonverifiable. Under such circumstances, a consumer may be reluctant to purchase from a for-profit producer, who has an incentive to contract for the production of one level of quality but ultimately deliver an inferior quality that costs less to produce. If the output is highly nonstandardized and infrequently purchased—such as in the health care and long-term care industries—reputation effects may be insufficient to discipline for-profit firms. Nonprofit and government organizations, however, are bound by nondistribution constraints, which prohibit them from distributing their profits, thereby attenuating their profit incentives and the associated incentive to cheat their customers. For this reason, researchers have hypothesized that consumers may prefer to purchase from nonprofit or government producers when quality is nonverifiable (Hansmann, 1980; Easley and O'Hara, 1983; Weisbrod, 1988; Glaeser and Shleifer, 2001). (These authors have generally applied their arguments to the case of nonprofit organizations, but since their arguments rest on the presence of a nondistribution constraint, one form of which also applies to governmental organizations, their arguments can also be extended to the latter type.) Thus data that imply

Downloaded from https://academic.oup.com/jleo/article-abstract/21/1/228/883711
by DIP.ECONOMIA BIBLIOTECA COGNETTI DE MARTIIS UNIVERSITA STUDI DI TORINO user
on 12 January 2018

a consumer preference for nonprofit or governmental outputs may reflect a perception that these ownership types will provide higher nonverifiable quality. That is, ownership type could represent to the consumer a signal of nonverifiable quality. If so, then the size of ownership effects that favor nonprofit and governmental organizations will measure the value of nonverifiable quality that the consumer expects to receive at these ownership types.

A third possibility is that for-profit, nonprofit, and government firms engage in systematic product differentiation in verifiable dimensions of output across ownership types, in which case ownership effects reflect consumer preferences over this differentiation. Such differentiation may occur as a result of differences in cost structures, with a wider variety of potentially profitable outputs available to lower-cost ownership types. For example, if nonprofits have lower costs as a consequence of the subsidies and tax exemptions that they receive, then they may be able to provide certain types of products that for-profits could not profitably produce.

While economists have advanced theoretical arguments in support of the existence of ownership effects, there are at least two arguments against their existence. First, when comparing otherwise identical outputs, consumers may not be aware of the ownership types that produced them. If consumers do not know the ownership type at the time of purchase, they will purchase randomly across ownership types, and no significant ownership effect will be observed. Evidence from Mauser (1993) suggests that many consumers are not aware of the ownership type from which they purchase. In the nursing home industry, such reasoning is particularly compelling, since in many cases prospective residents are in poor physical and mental health and find it difficult to process information and make rational decisions (Fraundorf, 1977). Moreover, many prospective residents lack agents (such as family members) to assist them with these decisions.

A second argument against the existence of ownership effects is that consumers may not care about ownership type, even if they are aware of it. They may believe, for example, that they can measure, contract on, and verify output quality sufficiently well that they do not need to rely on the signal that ownership type might send. In other words, information asymmetries and the attendant contracting problems may be less severe than much of the literature on nonprofit organizations presumes. To the extent that consumers view ownership type as irrelevant, one would not expect the data to reveal any significant ownership effects.

Given that theory provides arguments both for and against the existence of ownership effects, the question of whether they exist calls for empirical evaluation, and yet I am aware of very little research that investigates the extent to which ownership effects actually exist.[4] The issue is nonetheless important:

4. Mauser (1993) studies a related question in her analysis of nonprofit and for-profit day care facilities, but she does not measure ownership effects, as defined and discussed here, explicitly. Instead, her analysis seeks to identify the characteristics of consumers who choose nonprofit day care and asks how these differ from the characteristics of consumers who choose for-profit day care.

Downloaded from https://academic.oup.com/jleo/article-abstract/21/1/228/883711
by DIP.ECONOMIA BIBLIOTECA COGNETTI DE MARTIIS UNIVERSITA STUDI DI TORINO user
on 12 January 2018

Whether ownership effects exist has implications for the social value of nonprofit and government ownership types. The existence of positive ownership effects would suggest that nonprofit and government firms produce and sell outputs that are demanded by consumers but not offered by for-profits. This in turn suggests a welfare-enhancing role for these organizations. The absence of ownership effects, however, may reflect the irrelevance of ownership type, which would call into question the value of the substantial subsidies and tax dollars used to support nonprofit and government enterprises, respectively, in mixed markets. A third possibility is that nonprofit and government firms improve consumer welfare in ways that consumers do not recognize and which are therefore not captured in measured ownership effects.[5] Thus, while an empirical analysis that documents the presence of ownership effects may lend support to the notion that the presence of nonprofit and government firms increases welfare, a finding of no ownership effects would be less conclusive. Even so, a finding of no ownership effects would still be informative in that it would cast doubt on theories of the signal value of ownership type.

As an additional consideration, it is possible that a measured nonprofit ownership effect is actually a *religious* nonprofit ownership effect. That is, since many nonprofits have religious affiliations, the finding of a positive ownership effect for nonprofits may reflect a sense of trust that emanates less from the presence of the nondistribution constraint than it does from the organization's religious values. Some of the models estimated below consider this possibility explicitly.

3. Model and Empirical Strategy

The data, which are discussed in detail in the next section, contain information on nursing home location, price, number of residents, ownership type, and quality for each nursing home in the state of Wisconsin. Since my data do not contain individual-specific information, but can be used to form market shares, the empirical strategy relies on an aggregation assumption to deduce information about consumer preferences from firm-level market share data. Intuitively, if each individual selects the product that she prefers most, then, in the aggregate, a relatively high market share will reflect the average consumer's preference for that product, all things being equal.[6] For comparative

5. There is substantial supply-side literature on whether outputs differ across ownership types and the extent to which the differences measured in various dimensions of output are meaningful. See Weisbrod (1998) for a nice summary of this literature.

6. While the aggregation assumption itself—which assumes a particular distribution of disturbances in the econometric model—is standard, the framework used here is susceptible to criticism on other grounds. First, it assumes that individuals can choose freely among all available outputs, which may not be true in the nursing home industry. Second, it assumes that all consumers have the same preferences over ownership types. The first objection is addressed in the next section. The second can be dealt with in the context of a discrete choice random coefficients model, for which Berry, Levinsohn, and Pakes (1995) have developed estimation methods. Ballou (2000) fails to reject the hypothesis of identical coefficients on ownership effects for all individuals.

Downloaded from https://academic.oup.com/jleo/article-abstract/21/1/228/883711
by DIP.ECONOMIA BIBLIOTECA COGNETTI DE MARTIIS UNIVERSITA STUDI DI TORINO user
on 12 January 2018

purposes, alternative models that do not rely on free consumer choice are also presented in the results section.

More specifically, private payer consumers are assumed to choose among firm outputs based on the outputs' product attributes. That is, a consumer's preference for a given output reflects that consumer's preference for the bundle of attributes that the product embodies. In the case of the nursing home industry, the consumer will likely have preferences over a home's location, price, bed availability, and a set of variables that capture the perceived quality of the nursing home. Some of these variables, including information about ownership type, are available in the data. Other relevant variables are observed by the consumer but are not included in the data. Let the indirect utility accruing to consumer i when purchasing output j in market t be expressed as a linearization of a Cobb-Douglas utility function:

$$u_{ijt} = \beta' X_{jt} - \alpha \frac{p_{jt}}{W_{it}} + \xi_{jt} + \eta_{ijt},$$

where p is the price of nursing care, W is the individual's financial assets, η is an error term, and ξ is a firm-specific measure of average utility accruing to consumers as the result of nursing home characteristics that consumers can observe but are not measured in the data (henceforth referred to as unobserved quality). X is a vector that includes indicator variables for ownership status, a set of verifiable measures of quality (nurse aides per bed lagged one year, registered nurses per bed lagged one year, number of federal violations lagged one year), and a proxy for bed availability (log of the number of staffed beds).

The relevant market for nursing home j is the number of noninsured (or privately insured) individuals—the "private payers"—requiring nursing home care who would consider purchasing from nursing home j. I consider two alternative definitions of market, distinguished by their geographic scope. In the first, the market for a nursing home in county g is all prospective private-payer residents in county g. In the second, the market for a nursing home in county g is all prospective private payers in the state of Wisconsin. The first definition is both easy to analyze and sensible—particularly given that it corresponds relatively closely to the 20 mile radius frequently used as the market boundary by industry analysts when siting nursing homes[7]—but it is also more restrictive. For either definition, consumers in the market for nursing home care are assumed to have $J_t + 1$ choices: They may purchase from any of J_t nursing homes in market t, or they may choose instead to purchase an outside good (designated in the model as good 0), which is assumed here to be home health care. When all consumers select the care option that they most prefer, then the market share of nursing home j in market t is computed by integrating over the set of all values of η_{ijt}, such that $u_{ijt} > u_{ikt}$ for all k not equal to j, conditioning on nursing home characteristics, prices, and consumer wealth. As good measures of prospective nursing home residents' financial assets are not available,

7. I am indebted to a referee for making this point.

Downloaded from https://academic.oup.com/jleo/article-abstract/21/1/228/883711
by DIP.ECONOMIA BIBLIOTECA COGNETTI DE MARTIIS UNIVERSITA STUDI DI TORINO user
on 12 January 2018

median household income in market t—or county g of market t for the state-level market definition—is used as a crude proxy for individual wealth.[8]

If the error term has the extreme-value distribution, then the difference between the log of the market share of nursing home j in market t and the log of the share of home health care in the same year is expressed as a function of the independent variables in the familiar conditional logit model:

$$\ln(s_{jt}/s_{0t}) = \beta' X_{jt} + \alpha \frac{p_{jt}}{y_t} + \xi_{jt}. \tag{1}$$

This is the specification that I will estimate when market boundaries are defined by county boundaries.

The use of county boundaries for markets is in many respects reasonable for studies of nursing home choice, as prospective nursing home residents are typically assumed to have strong preferences over locations. Even so, such a definition of the market may be restrictive for at least two reasons. First, prospective residents may move from other parts of the state to a nursing home near their children. Second, prospective residents may come to a nursing home from a nearby county, a scenario that seems particularly likely in urban areas, where counties are geographically smaller and more densely populated. To accommodate the possibility that prospective residents move across county boundaries, I redefine the market to include all prospective private-payer nursing home residents in the state in a given year. Following methods developed by McFadden (1978) and Cardell (1997), I adopt an error structure that permits a consumer's preferences for nursing homes in a given county to be correlated. For consumer i purchasing from nursing home j in county g and market t, the composite error term is expressed as

$$\eta_{ijt} = \varsigma_{igt} + (1 - \sigma)\varepsilon_{ijt}, \tag{2}$$

where σ is a parameter to be estimated that captures the strength of any within-county correlation.[9] The latter term, ε_{ijt}, is interpreted as the consumer-specific deviation from the average consumer utility associated with unmeasured characteristics of nursing home j in market t. If η is distributed according to the extreme value distribution, then the model is a standard nested logit with one level of nesting. The market shares associated with such an error structure are given by

8. Thus the price term in the model to be estimated is measured with error, v_{ijt}. It can be shown that if η_{ijt} is distributed according to the extreme-value distribution, there exists a unique distribution for v_{ijt} such that the composite error term, $\alpha v_{ijt} + \eta_{ijt}$, also has an extreme-value distribution. Specifically, suppose that v is distributed according to $C(1/\alpha, \alpha)$, where the $C(\cdot)$class of distributions is defined in Cardell (1997). (Recall that α is the coefficient on the poorly measured variable.) Then an application of Theorem 2.1 from Cardell (1997) shows that $\alpha v(\alpha) + \eta$ is distributed according to the extreme-value distribution. Furthermore, the composite error term is, by construction, independent of the value of α. The assumptions placed on the distribution of v are restrictive; price and income effects should be interpreted cautiously.

9. Theory restricts σ to the interval [0,1]. Values of σ approaching one indicate that unmeasured individual-specific preferences are driven almost solely by location, whereas values approaching zero imply that the within-group correlation of preferences is relatively weak.

Downloaded from https://academic.oup.com/jleo/article-abstract/21/1/228/883711
by DIP.ECONOMIA BIBLIOTECA COGNETTI DE MARTIIS UNIVERSITA STUDI DI TORINO user
on 12 January 2018

$$s_{jt} = \frac{\exp\left[\left(\beta' X_{jt} + \alpha \frac{p_{jt}}{y_{gt}} + \xi_{jt}\right) \Big/ (1-\sigma)\right]}{D_g^{\sigma} \sum_h D_h^{1-\sigma}}, \tag{3}$$

where g is the county of nursing home j, h indexes all counties, $D_g = \sum_{j_g} \exp\left[\left(\beta' X_{j_g t} + \alpha(p_{j_g t}/y_{gt}) + \xi_{jt}\right)/(1-\sigma)\right]$, and j_g indexes all nursing homes in county g. After some manipulation (see Berry, 1994), the expression for market shares can be rewritten as

$$\ln(s_{jt}/s_{0t}) = \beta' X_{jt} + \alpha \frac{p_{jt}}{y_t} + \sigma \ln(s_{jt|g}) + \xi_{jt}, \tag{4}$$

where $s_{jt|g}$ is the within-county market share—that is, the market share of nursing home j in market t computed only with respect to other nursing homes in county g.[10] This is the second model that I will estimate. In addition to the structural models described by Equations (1) and (4), I also estimate reduced form models (with private payers and private-payer market shares as the dependent variables) for purposes of comparison.

Several points should be noted regarding the estimation of the structural models. The first is that certain dimensions of unobserved quality—that is, those captured by ξ_{jt}—may change little over time. To the extent that this is true, fixed effects estimation is appropriate. In the fixed effects models, the error term in the regression specification represents not unobserved quality, but rather the deviation in a given year of unobserved quality from its nursing home-specific mean. The fixed effects models estimated here contain both firm and year effects.

The presence of fixed effects in the model implies that the effects of nursing home attributes that do not vary over time cannot be estimated in the same regression. For the purposes of this article, the most important of these attributes is ownership type.[11] These effects can be recovered with a minimum distance procedure that regresses estimates of the fixed effects from the original specification on the time invariant product attributes (Chamberlain, 1982; Nevo, 2001). Since all variables involved in this second regression are time invariant, the procedure relies on cross-sectional variation in ownership types to identify ownership effects.[12]

Both price and within-county market share are endogenous variables. One expects that both prices and within-county market shares will be higher when nursing homes provide abnormally high unobserved quality. Thus price and

10. See Cardell (1997, Theorem 3.1). For a more complete discussion of this class of models, see McFadden (1978).

11. While ownership type can theoretically vary over time through facility conversions, such conversions are rare; moreover, I treat a nursing home that changes ownership as two separate firms, one for the first owner, and one for the second.

12. The implementation of this two-step procedure is straightforward, although the computation of the covariance matrix for the combined first-stage and second-stage estimates requires some routine calculation. Computational details are available from the author upon request.

Downloaded from https://academic.oup.com/jleo/article-abstract/21/1/228/883711
by DIP.ECONOMIA BIBLIOTECA COGNETTI DE MARTIIS UNIVERSITA STUDI DI TORINO user
on 12 January 2018

within-county market share are each likely to be correlated with the error term and require instruments. The Medicaid reimbursement rate is used as an instrument for price, whereas the average number of beds of other nursing homes in the county and the number of competing nursing homes in the county are instruments for within-county market share, following the suggestion of Berry (1994).

For purposes of estimation, nursing home market shares are computed on the basis of private-payer skilled nursing care residents in the facility on December 31. It is also possible to compute market shares based on private-payer admissions. In most circumstances, market shares based on this latter measure would be preferable. In the case of nursing homes, however, such a measure is likely to give misleading results, since it includes not only "true" private payers—those whose assets will be sufficient to cover nursing home bills for a year or longer—but also "false" private payers (Nyman, 1989), who are technically private payers upon admission but will shortly thereafter be forced onto Medicaid and are therefore frequently treated by nursing homes as if they are Medicaid payers at the time of admission—that is, they are queued. A model with persistent queuing is not amenable to the revealed preference assumptions that motivate the structural models discussed above. (I discuss this in greater detail in Section 5.) In the alternative reduced-form models, however, I do report results of models using admissions-based market shares for purposes of comparison.

4. Industry Description and Data

4.1. Nursing Home Care

Nursing homes provide care for individuals who need assistance with one or more activities of daily living (ADLs), which are generally defined to include eating, walking, dressing, bathing, getting into and out of a chair/bed, using the toilet, and continence. As a result, the primary determinant of the quality of nursing care is the quality of the nursing staff that assists the residents. Certain dimensions of nursing quality are straightforward to measure, such as level of training (registered nurse, etc.). Other dimensions, such as average years of experience or turnover, may be more difficult for prospective residents to assess. Still other dimensions, such as the attentiveness and responsiveness of the nursing staff, require a subjective assessment, which may be difficult to determine ex ante or—since the precise nature of required nursing care is highly specific to the individual—communicate to other prospective residents ex post.

Nursing home care is but one of a number of long-term care options available to elderly individuals who are no longer able to live independently. Perhaps the closest substitutes are care by relatives and home health care. Home health care is provided through agencies that supply nurses to the individual's residence on a regular basis. Other forms of long-term care are more distant substitutes, with assisted living facilities and retirement communities generally serving the needs of elderly who do not require the level of assistance that would warrant nursing home care or home health care.

Downloaded from https://academic.oup.com/jleo/article-abstract/21/1/228/883711
by DIP.ECONOMIA BIBLIOTECA COGNETTI DE MARTIIS UNIVERSITA STUDI DI TORINO user
on 12 January 2018

Depending on the intensity of care required, nursing home residents are generally classified as either skilled nursing care or intermediate care residents; the former require more intensive and constant nursing care and are consequently charged more. Skilled nursing care residents represent the large majority of nursing home admissions, and these residents are consequently the focus of this study. During the period analyzed here, private funds and Medicaid represented the primary sources of payment to nursing homes. Many individuals without sufficient private funds to afford nursing home care are admitted with Medicaid funding. Of the individuals who are admitted to nursing home care with their own funds, on the order of 10% spend down their private assets and enroll in Medicaid prior to being discharged (Spence and Wiener, 1990). During the period under consideration, relatively few private payers were covered by long-term care insurance, with less than 1% of all nursing home costs covered by private long-term care insurance as of the early 1990s (Wiener , Illston, and Hanley, 1994; Binstock, Cluff, and von Mering, 1996). While the government determines Medicaid reimbursement rates prospectively in Wisconsin, the nursing home can choose the price that it charges its private payers.[13] Assuming, then, that the Medicaid reimbursement rate is above the marginal cost of production and below the willingness to pay of some private payers, the profit-maximizing nursing home will prefer to admit residents with private funds and will only admit Medicaid residents after private-payer demand has been satisfied. Since Medicaid residents are unlikely to be able to choose freely among all nursing homes, only demand by private-payer residents is studied in this article.

An individual who requires nursing home care may apply to any number of nursing homes for admission. As part of the application process, the applicant must complete a medical examination and be under the care of a physician. The nursing home will also request and examine data on the individual's financial status to determine the individual's ability to pay. The application process culminates in the nursing home's decision to accept or reject the application. A commonly given explanation for rejection is that the applicant's required level of care exceeds that which the facility can provide. An applicant who is accepted will be placed on a waiting list for admission if a bed is not immediately available. Nursing homes in Wisconsin are granted full discretion over how they admit their residents, but are required to provide comparable care to comparable residents who have already been admitted.[14] Thus a Wisconsin nursing home may legally discriminate against the less profitable Medicaid patients in the admissions process, but it may not legally reduce the level of care provided to a Medicaid resident below the level that is provided to a comparably healthy private-payer resident.

13. Private-payer rates were regulated in several states during this period; Wisconsin, however, was not one of them.

14. Interview with Robert Huncosky, Programming and Planning Analyst, Wisconsin Bureau of Quality Assurance, Madison, WI (October 13, 2000).

Downloaded from https://academic.oup.com/jleo/article-abstract/21/1/228/883711
by DIP.ECONOMIA BIBLIOTECA COGNETTI DE MARTIIS UNIVERSITA STUDI DI TORINO user
on 12 January 2018

4.2. Data

The primary source of data for this study is the *Wisconsin Nursing Home Directory and Fact Book*. This directory is an annual publication of the Wisconsin Center for Health Statistics and covers all nursing homes in the state. For each nursing home, data are provided on ownership type, private-payer prices, Medicaid reimbursement rates, the number of private payers admitted (for years after 1987), the number of private payers in residence on December 31, the number of staffed beds, bed capacity, the average daily census, the full-time equivalent number of nurses of various designations (registered nurse, licensed practical nurse, nurse aide), the fraction of stays that are less than one year, and the address of the facility. The Wisconsin Bureau of Quality Assurance provided data on federal violations by nursing homes (specifically, the number of federal violations for which each nursing home was cited for each year). Several of these variables capture dimensions of the quality of a nursing home. In particular, I use the following variables to measure verifiable components of nursing home quality: the number of registered nurses per bed, the number of nurse aides per bed, and the number of federal violations. In the discussion of the data that follows, I will frequently compare for-profits with all other organizations, meaning the set of nonprofit and government firms taken together; I refer to this set of organizations as "not-for-profits."

The raw data, which consisted of 4896 observations, were reduced to the dataset analyzed here according to the following steps. First, records for which variables of interest—that is, those variables that are used in the estimation routines—had negative or missing values were deleted. Second, all records for which the private payer price of care was less than one dollar per month were eliminated. Finally, nursing homes with hospital affiliations were deleted from the sample, since demand for these nursing homes may actually reflect demand for (or elements of demand for) the attached hospital. The resulting dataset contained 3605 observations over the 12 years from 1984 to 1995, corresponding to an average of roughly 300 nursing homes per year.

In general, the data appear to be measured accurately, with the exception of private-payer prices. Many nursing homes have both single and double rooms for their residents; residents occupying a single room pay a higher price. Whenever a nursing home submits both private-payer prices to the Center for Health Statistics, however, the directory reports only a single price, which is the average of the two numbers.

Descriptive statistics for the pooled sample are reported in Table 1. Slightly more than 48% of the sample is not-for-profit, with the distribution of not-for-profits breaking down fairly evenly across the religious nonprofit, secular nonprofit, and government ownership types. Occupancy rates average 93%, suggesting that many nursing homes are at capacity. The within-county market share for a given nursing home is around 19%, indicating that in a given year the typical nursing home will care for roughly one-fifth of the private-payer patients receiving nursing care in the county. Note that the average private-payer rate exceeds the average Medicaid reimbursement rate by $9.60 per

Downloaded from https://academic.oup.com/jleo/article-abstract/21/1/228/883711
by DIP.ECONOMIA BIBLIOTECA COGNETTI DE MARTIIS UNIVERSITA STUDI DI TORINO user
on 12 January 2018

Table 1. Descriptive Statistics for the Pooled Sample (1984–1995)

	Mean	Std. Dev.	Minimum	Maximum
Religious nonprofit ownership	0.18	0.38	0	1
Secular nonprofit ownership	0.13	0.34	0	1
Government ownership	0.17	0.38	0	1
Private payers (admissions)	21.07	20.31	0	226
Private payers (Dec. 31)	23.65	21.32	1	366
Total admissions	79.34	64.77	0	645
Total residents (Dec. 31)	119.16	81.05	16	744
Average daily census	119.59	81.32	16	743
Staffed beds	127.82	86.03	16	749
Licensed beds (capacity)	129.65	86.79	16	721
Occupancy rate[a]	0.93	0.08	0.33	1
Within-county market share[b]	0.19	0.20	0.0006	1
Private payer price ($/day)	47.48	12.74	24.89	528.44
Medicaid reimbursement rate ($/day)	37.88	4.84	22.73	70.59
Registered nurses	9.53	7.01	1.37	67.51
Nurse aides	45.38	31.99	0	423.57
Registered nurses per bed	0.08	0.03	0.02	0.29
Nurse aides per bed	0.36	0.09	0	0.80
Located in MSA	0.55	0.50	0	1
Federal violations	8.15	10.28	0	133
Fraction of stays less than one year	0.29	0.10	0	1
Sample size	3605			

Annual data, pooled over the sample period. Annual data were available on December 31. Admissions data were collected from 1987 through 1995.
[a]The occupancy rate is defined here as residents (December 31) divided by licensed beds.
[b]Within-county market shares are with respect to private-payer residents receiving skilled nursing care in the county on December 31.

day, or just over $3500 per year. Also note that somewhat more than half of all nursing homes are located in a metropolitan statistical area (MSA).

Table 2 reports sample means for selected variables, by ownership type. On average, religious nonprofits admit the most private payers in a given year and have the most in residence at the end of the year, while for-profits have the fewest. Government facilities have the largest capacities and the smallest fraction of residents staying less than one year; they are also least likely to locate in an MSA. Private-payer prices are comparable across all four ownership types. Of particular relevance to this study are the within-county market shares, which are generally smaller at for-profit nursing homes than at the other three ownership types.

Given the high occupancy rates and the difficulty of expanding capacity,[15] one might conjecture that market shares—as measured by the nursing homes' shares

15. During the time period studied here, nursing homes in Wisconsin were subject to certificate-of-need laws, according to which nursing homes were only allowed to expand if they were successful in convincing the state government that expansion was clinically necessary.

Downloaded from https://academic.oup.com/jleo/article-abstract/21/1/228/883711
by DIP.ECONOMIA BIBLIOTECA COGNETTI DE MARTIIS UNIVERSITA STUDI DI TORINO user
on 12 January 2018

Table 2. Selected Descriptive Statistics, by Ownership Type

	For-profit	Religious nonprofit	Secular nonprofit	Government
Private payers (admissions)	19.57 (15.04)	36.05 (24.24)	24.93 (20.48)	22.09 (28.59)
Private payers (Dec. 31)	17.59 (17.16)	28.92 (21.99)	24.04 (24.83)	21.20 (20.55)
Licensed beds (capacity)	119.57 (81.19)	136.42 (78.43)	104.12 (62.10)	172.54 (109.32)
Occupancy rate[a]	0.92 (0.08)	0.96 (0.05)	0.93 (0.08)	0.91 (0.09)
Within-county market share[b]	0.18 (0.21)	0.20 (0.18)	0.18 (0.19)	0.22 (0.21)
Private payer price ($/day)	47.97 (14.95)	47.75 (10.23)	46.38 (9.67)	46.59 (9.47)
Medicaid reimbursement rate ($/day)	36.59 (3.96)	38.59 (4.94)	38.57 (4.71)	40.49 (5.83)
Registered nurses per bed	0.07 (0.03)	0.08 (0.03)	0.08 (0.03)	0.08 (0.03)
Nurse aides per bed	0.34 (0.08)	0.39 (0.09)	0.36 (0.09)	0.37 (0.09)
Located in MSA	0.57 (0.50)	0.58 (0.49)	0.60 (0.49)	0.42 (0.49)
Federal violations	8.85 (11.28)	7.46 (9.25)	7.45 (9.57)	7.32 (8.34)
Fraction of stays less than one year	0.31 (0.10)	0.27 (0.08)	0.29 (0.10)	0.25 (0.09)
Sample size	1859	640	483	623

Annual data, pooled over the sample period. Annual data were available on December 31. Admissions data were collected from 1987 through 1995. Standard deviations are in parentheses.
[a]The occupancy rate is defined here as residents (December 31) divided by licensed beds.
[b]Within-county market shares are with respect to private-payer residents receiving skilled nursing care in the county on December 31.

of residents—may simply reflect differential capacities. That is, if not-for-profit nursing homes in Wisconsin have a higher share of beds than do for-profits, a higher share of private-payer residents at not-for-profits may simply reflect this higher bed share. Figure 1 compares not-for-profit private-payer shares and bed shares over the sample period. A nursing home's private-payer share in a given year is computed as the total number of private payers in the home on December 31, divided by the total number of private payers in all nursing homes on December 31 of that year. (Bed shares are computed similarly.) As the two trends reveal, private-payer shares and bed shares are clearly not independent. Nonetheless, the trends are not identical, suggesting that capacity can explain but a part of the allocation of nursing home residents across facilities. I revisit the issue of differential capacity constraints and patient turnover rates in the estimations.

The trends in private-payer shares, by type of not-for-profit, are shown in Figure 2. In all years, private-payer shares are highest at religious not-for-profits. While the private-payer advantage enjoyed by religious nonprofits dips slightly over the sample period, the secular nonprofit private-payer share

Downloaded from https://academic.oup.com/jleo/article-abstract/21/1/228/883711
by DIP.ECONOMIA BIBLIOTECA COGNETTI DE MARTIIS UNIVERSITA STUDI DI TORINO user
on 12 January 2018

Figure 1. Not-for-profit shares of private payers and licensed beds.

nearly doubles; the government private-payer share is roughly the same at the end of the sample period as in the beginning.

5. Results

The results of several different specifications—all with fixed firm and year effects included—are shown in Table 3. The first two columns provide estimates of the model based on Equation (1) (the "simple model"). The third and fourth columns present the corresponding estimates for the nested model [Equation (4)]. The primary result is that all four models yield a positive and significant coefficient on nonprofit status, indicating higher market shares for nonprofits (relative to for-profits), ceteris paribus. The government effect is negative for all models except the ordinary least squares (OLS) simple model.[16]

Turning to the other variables, note that the coefficients generally have the anticipated signs (negative for more violations and higher prices, positive for more nurses and more beds and—in the case of the nested model—higher within-county market share), even though several have relatively large standard errors. The anticipated effect of instrumenting for income-adjusted price and

16. A comparison of the price coefficients across models suggests that the models with instruments are more reliable than those using OLS, suggesting that the positive government effect in column (i) be discounted.

Downloaded from https://academic.oup.com/jleo/article-abstract/21/1/228/883711
by DIP.ECONOMIA BIBLIOTECA COGNETTI DE MARTIIS UNIVERSITA STUDI DI TORINO user
on 12 January 2018

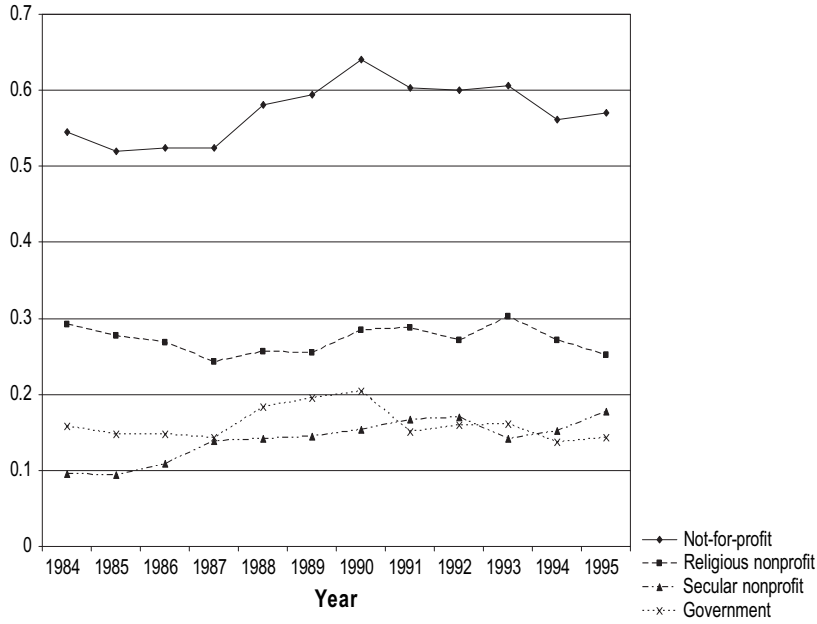

Figure 2. Religious nonprofit, secular nonprofit, and government private-payer shares.

within-county market share is seen in a comparison of the relevant coefficients for a given specification: Instruments result in a more negative price coefficient and a less positive within-county market share coefficient. The coefficients on price seem reasonable when compared with earlier work. For example, the coefficient on price in column (iv) implies an own-price elasticity of demand of -1.25 when evaluated at the median values of within-county market share, annualized price of care, and household income, which is comparable to the elasticities previously estimated by Nyman (1989) and Scanlon (1980).[17]

The minimum distance R^2 is a measure of the amount of cross-sectional variation in the estimated fixed effects that is explained by ownership type. The values of this statistic are generally low across specifications, suggesting that much of the variation in the fixed effects is due to the presence of unobserved quality that is not picked up by the ownership effects. The minimum distance chi-square statistic tests the hypothesis that unobserved quality is equal to zero (Nevo, 2001). This hypothesis is easily rejected in all specifications, confirming the importance of modeling unobserved quality explicitly. I assessed the

17. The elasticities were computed for within-county market shares rather than for overall market shares to facilitate comparisons with earlier results, which assume that the county is the relevant market and do not consider the influence of an outside good. Marginal effects are derived from the formula for within-county market share under the assumptions on the error structure discussed previously: $s_{jt|g} = \exp((\beta' X_{jt} - \alpha(p_{jt}/y_{jt}) + \xi_{jt})/(1-\sigma))/(\sum_k \exp((\beta' X_{kt} - \alpha(p_{kt}/y_{kt}) + \xi_{kt})/(1-\sigma)))$, where the sum is taken over all nursing homes k in the same county as nursing home j. This implies an own-price elasticity of demand of $-\alpha/(1-\sigma)(p_{jt}/y_{jt})(1-s_{jt|g})$.

Downloaded from https://academic.oup.com/jleo/article-abstract/21/1/228/883711
by DIP.ECONOMIA BIBLIOTECA COGNETTI DE MARTIIS UNIVERSITA STUDI DI TORINO user
on 12 January 2018

Table 3. Estimates from the Latent Utility Model

	(i) OLS Simple	(ii) 2SLS Simple	(iii) OLS Nested	(iv) 2SLS Nested
Nonprofit	0.41*	0.35*	0.20*	0.20*
	(0.10)	(0.10)	(0.04)	(0.05)
Government	0.47*	−0.38*	−0.37*	−0.36*
	(0.14)	(0.15)	(0.06)	(0.07)
Aides per bed (lag)	0.22	0.20	0.05	0.10
	(0.17)	(0.17)	(0.12)	(0.16)
RNs per bed (lag)	0.27	0.33	0.23	0.39
	(0.44)	(0.46)	(0.24)	(0.32)
Federal violations (lag)	−0.0003	−0.0003	−0.0010*	−0.0009*
	(0.0008)	(0.0008)	(0.0004)	(0.0004)
Staffed beds (log)	0.37*	0.42*	0.05	0.13*
	(0.16)	(0.16)	(0.08)	(0.07)
Annual price / average income	−0.08	−0.95*	−0.04	−0.86*
	(0.06)	(0.54)	(0.28)	(0.37)
Within-county market share (log)			0.86*	0.70*
			(0.26)	(0.41)
Constant	−5.04*	−4.73*	−9.41*	−9.35*
	(0.31)	(0.34)	(0.14)	(0.16)
Minimum distance R^2	0.02	0.09	0.25	0.21
Minimum distance χ^2	1763.06	372.31	1583.23	1226.85
Sample size	3605	3605	3605	3605

Robust standard errors are in parentheses. All specifications are estimated with firm and year fixed effects. The dependent variable is the log of the ratio of firm market share to outside good market share. Market shares are constructed based on the number of SNF private-payer residents on December 31.
*Significant at the 10% level or better.

performance of the instruments using standard tests.[18] As with all subsequent nested logit regressions, the validity of the instruments was confirmed using an overidentification test from Basmann (1960).[19]

The estimated ownership effects are nontrivial. Based on the estimates in column (ii), the typical nonprofit is predicted to have a within-county market share that is 3.3 percentage points higher than that of an otherwise comparable for-profit when the effect is evaluated at the median market share. Given the average potential market size for private-payer skilled nursing care in a Wisconsin

18. For the nonnested logit in column (ii), the first-stage regression of income-adjusted price on the instruments yielded an R^2 value of 0.14. Under the assumption that year-specific deviations from a firm's mean unobserved quality are normally distributed, the F-statistic for the significance of the regression is 34.26. For the nested model in column (iv), the R^2 and F-values are 0.13 and 31.04, respectively. For the nested model, the first-stage regression of within-county market share on the instruments resulted in less compelling numbers (R^2 and F-values of 0.02 and 3.39, respectively). In summary, the instruments for price do a reasonably good job of explaining that variable, whereas the instruments are relatively weakly correlated with within-county market share.

19. For the nested logit, the model failed to reject the hypothesis that the instruments are uncorrelated with the model's error term, with an F-value of 2.48 corresponding to a p-value of .12. Recall that the simple model is exactly identified and therefore not amenable to standard tests of instrument validity.

Downloaded from https://academic.oup.com/jleo/article-abstract/21/1/228/883711
by DIP.ECONOMIA BIBLIOTECA COGNETTI DE MARTIIS UNIVERSITA STUDI DI TORINO user
on 12 January 2018

county (103.5), this figure implies that the typical nonprofit will care for between three and four more private-payer residents than an otherwise comparable for-profit facility. The median market size, at 52.5, is substantially lower, implying that in the median county, nonprofits will have roughly two more private-payer residents than otherwise comparable for-profits. The corresponding effect for government nursing homes is −3.5 percentage points, corresponding to four fewer private payers than at an otherwise comparable for-profit in the mean county, and two fewer patients in the median county. The nonprofit and government effects implied by the results in column (iv) are substantially larger, at 6.4 percentage points and −11.5 percentage points, respectively.

5.1. The Problem of Strategic Location

The interpretation of these estimated ownership effects as a reflection solely of consumer preference will be incorrect if different ownership types tend to locate in different markets: To the extent that prospective residents have strong preferences over location and different organizational forms tend to locate in different locales, then the estimated ownership effects will be driven in part by supply-side decisions, not consumer demand. Thus an elderly individual with a preference for nonprofit nursing homes may have an even stronger preference for remaining near her primary residence. If the only option in her neighborhood is a for-profit nursing home, she will enter a for-profit home even though she prefers nonprofits.

Table 4 provides information on the extent to which multiple ownership types coexist at the county level. More than one ownership type is present for roughly 70% of all county-years; that is, markets with only one choice of ownership type are relatively less common. Across the state and all years, for-profits dominate the "single-type" county-years. Markets are mixed at the county level if more than one ownership type operates in the county. The most common configuration is the coexistence of all three ownership types (304 county-years), while the least common configuration is the coexistence of nonprofit and government organizations with no for-profits (51).

The evidence on the relationship between nursing home location and ownership type is limited. Ballou (2003) considers the potential impact of both demand-side and supply-side market conditions and finds that nonprofit and

Table 4. Mixed Markets and the Distribution of Ownership Types Across Counties

County-years with a single ownership type		248
	For-profit only	171
	Nonprofit only	57
	Government only	20
County-years with multiple ownership types		576
	For-profit and nonprofit only	116
	For-profit and government only	105
	Nonprofit and government only	51
	For-profit, nonprofit, government	304
Total county-years		824

Downloaded from https://academic.oup.com/jleo/article-abstract/21/1/228/883711
by DIP.ECONOMIA BIBLIOTECA COGNETTI DE MARTIIS UNIVERSITA STUDI DI TORINO user
on 12 January 2018

for-profit nursing homes do not enter significantly different markets. However, evidence from the same study clearly shows that governmental nursing homes do enter systematically different markets than private nursing homes do. Addressing the potential endogeneity of ownership type is difficult: Lacking a strong theory of the determination of ownership type, it is difficult to justify (and easy to criticize) virtually any mooted instrument for ownership type.

A more promising approach is to limit the sample to contain only markets that are mixed at the county level. Results of a series of regressions based on this strategy are shown in Table 5. The first column reproduces column (iii) of Table 3—the instrumental variable version of the nonnested logit—for purposes of comparison.[20] The second column reestimates this model using only markets containing at least one governmental nursing home, at least one nonprofit nursing home, and at least one for-profit nursing home. For these counties there is no problem of strategic location, since county residents can choose from any one of three ownership types. The third column omits all markets with governmental nursing homes, and the fourth retains only counties that have (1) no governmental nursing homes and (2) at least one nonprofit nursing home and at least one for-profit nursing home.

The results of Table 5 are generally consistent with those of Table 3. In column (ii), the governmental effect remains negative, and although the nonprofit effect disappears in that column, it reappears and increases in magnitude in columns (iii) and (iv) when only markets with no government firms (i.e., private firms only) are considered. Moreover, if one separates the nonprofit effect in column (ii) into a religious nonprofit effect and a secular nonprofit effect, the religious nonprofit effect is positive and significant (a coefficient of 0.30 with a standard error of 0.17), so only the secular nonprofit effect loses its significance. Thus, after ensuring the presence of local options in the model, government nursing homes continue to have lower market shares than otherwise comparable for-profits, and nonprofits have higher market shares than for-profits. Insofar as the other regressors are concerned, they are less likely to be significant in the restricted samples, although they generally remain correctly signed.

5.2. The Role of Capacity Constraints

Independent of the issue of strategic location, the presence of binding capacity constraints at a given nursing home may also bias the results reported in Table 3. In general, for-profit nursing homes that would otherwise be forced to ration private-payer demand can be expected to eliminate excess demand by raising their private-payer rates. Since it is not clear that nonprofit and government nursing homes maximize profits, however, these two ownership types may not raise private-payer rates to clear excess private-payer demand. To the extent that nonprofit and government nursing homes ration private payers while for-profits do not, the ownership effects estimated above understate the true

20. Note that the redefinition of the sample precludes the use of nested-type models. Therefore only nonnested logits are estimated in this table.

Downloaded from https://academic.oup.com/jleo/article-abstract/21/1/228/883711
by DIP.ECONOMIA BIBLIOTECA COGNETTI DE MARTIIS UNIVERSITA STUDI DI TORINO user
on 12 January 2018

Table 5. The Latent Utility Model with Restricted Market Samples

	(i) Full Sample	(ii) Fully Mixed Markets	(iii) Private Firms Only	(iv) Fully Mixed Private Markets
Nonprofit	0.35*	0.08	0.46*	0.61*
	(0.10)	(0.12)	(0.09)	(0.09)
Government	−0.38*	−0.28*		
	(0.15)	(0.16)		
Aides per bed (lag)	0.20	0.33	0.31*	0.23
	(0.17)	(0.20)	(0.18)	(0.19)
RNs per bed (lag)	0.33	0.43	0.73	0.03
	(0.46)	(0.59)	(0.46)	(0.51)
Federal violations (lag)	−0.0003	−0.0008	−0.0001	−0.0002
	(0.0008)	(0.0011)	(0.0008)	(0.0009)
Staffed beds (log)	0.42*	0.54*	0.30	0.26
	(0.16)	(0.18)	(0.19)	(0.24)
Annual price / average income	−0.95*	−2.23*	0.42	0.82
	(0.54)	(0.67)	(0.52)	(0.64)
Constant	−10.97*	−6.40*	−5.24*	−4.82*
	(0.34)	(0.45)	(0.33)	(0.36)
Minimum distance R^2	0.09	0.03	0.02	0.04
Minimum distance χ^2	372.31	432.51	1863.36	1550.74
Sample size	3605	2193	1252	978

Robust standard errors are in parentheses. All specifications are estimated with firm and year fixed effects. The dependent variable is the log of the ratio of firm market share to outside good market share. Market shares are constructed based on the number of SNF private-payer residents on December 31.
*Significant at the 10% level or better.

consumer preference for nonprofits and overstate the consumer's dislike of government facilities. That is, the true nonprofit ownership effect is larger than the estimated effect if capacity constraints are forcing private payers away from nonprofits and toward the less preferred for-profit facilities.

The structural models are based on "nearly free" choice at a given point in time among all existing products. If consumers cannot choose freely, then the aggregation assumption of the model is not valid and the model estimates cannot be interpreted as parameters of individual utility functions. When private-payer waiting times are short relative to the period for which the data are collected (one year, in the case of the Wisconsin nursing home data), the models presented here—which include a proxy for waiting times—will do a reasonably good job of accommodating them. When actual private-payer waiting times are long relative to a year, however, these models are less satisfactory.

It is not possible to determine from the nursing home data whether private payers generally face extended waiting times for admission, that is, whether capacity constraints at nonprofit and government nursing homes are truly binding with respect to private payers. Prospective Medicaid residents effectively receive nursing home care at a price of zero, implying that the total demand for nursing home care is large relative to the number of licensed nursing home beds. Therefore one expects that all nursing homes will operate at or near capacity

Downloaded from https://academic.oup.com/jleo/article-abstract/21/1/228/883711
by DIP.ECONOMIA BIBLIOTECA COGNETTI DE MARTIIS UNIVERSITA STUDI DI TORINO user
on 12 January 2018

—assuming that the Medicaid reimbursement rate exceeds the marginal cost of a facility's last available bed—since under such circumstances nursing homes will always find it profitable to fill all of their beds. This does not necessarily imply that a private payer will have to wait for an extended period for an available bed, however, since nursing homes that prefer to admit private payers can always move them to the top of the waiting list. Moreover, since it is costless to put one's name on a waiting list, predicted waiting times that are based only on resident turnover and the length of waiting lists will consistently overstate actual waiting times.

If actual waiting times (for private payers) at nonprofit and government nursing homes are sufficiently long, then a model that considers the influence of supply constraints explicitly and does not rely on an assumption of unconstrained utility maximization will be preferable. One might expect that market shares will be a function of demand-side variables relating to quality of care and supply-side variables that influence the availability of beds, such as bed turnover (measured here by the fraction of residents with lengths of stay of less than one year) and bed capacity. The results of such regressions are presented in Table 6. The dependent variable in the first column is the log of the number of private payers in residence at the end of the year, while the dependent variable in the second column is the log of the number of private-payer admissions. The dependent variables in the third and fourth columns are the logs of the within-county market shares of end-of-year private payers and private-payer admissions, respectively. The independent variables include, in addition to the regressors employed above, a dummy variable indicating whether the nursing home is located in a MSA and interactions between the supply-side variables and ownership indicator variables. As previously, price is assumed to be endogenous. Relative to the preceding structural model of utility maximization, this reduced-form model has the advantage of incorporating supply-side variables that plausibly influence private-payer market shares instead of implicitly assuming free consumer choice. This advantage is not without cost, however, as the present model is unable to incorporate consumer preferences over specific locations or measure meaningful substitution effects across nursing homes.

The results of the regressions are consistent with those of the earlier model, with ownership effects positive at nonprofits and negative at the government facilities. The models that utilize the log of within-county market share as the dependent variable are in several respects less satisfactory than the models that use the log of private payers. (Note, e.g., the small magnitude and statistical insignificance of the price elasticity in columns three and four.) The latter two models do, however, allow for a more direct comparison of ownership effects with those estimated in the earlier utility maximization model. Based on the results presented in column three, the nonprofit and government ownership effects are 3.0 and −5.1 percentage points, respectively.[21] Thus a nonprofit is predicted to have a within-county market share that is three percentage points

21. These effects were evaluated at the mean values of capacity and fraction of patients residing less than one year.

Downloaded from https://academic.oup.com/jleo/article-abstract/21/1/228/883711
by DIP.ECONOMIA BIBLIOTECA COGNETTI DE MARTIIS UNIVERSITA STUDI DI TORINO user
on 12 January 2018

Table 6. Estimates from the Reduced-Form Model with Supply- and Demand-Side Variables

	Log of private payers		Log of within-county market share	
Dependent variable	End of Year (1984-1995)	Admissions (1988-1995)	End of Year (1984-1995)	Admissions (1988-1995)
Nonprofit	0.33*	0.30	0.41*	0.35
	(0.16)	(0.27)	(0.16)	(0.25)
Government	−0.06	−0.77*	−0.16	−0.68*
	(0.24)	(0.42)	(0.25)	(0.39)
Aides per bed	0.87*	0.52*	0.82*	0.43*
	(0.14)	(0.26)	(0.14)	(0.24)
RNs per bed	0.55	0.47	0.08	0.14
	(0.39)	(0.72)	(0.40)	(0.67)
Federal violations	−0.0023*	−0.0014	−0.0015*	−0.0012
	(0.0007)	(0.0015)	(0.0007)	(0.0014)
Staffed beds (log)	0.44*	0.84*	0.31*	0.65*
	(0.11)	(0.21)	(0.11)	(0.20)
Nonprofit * log(beds)	−0.02	−0.04	−0.04	−0.03
	(0.03)	(0.07)	(0.04)	(0.06)
Government * log(beds)	−0.13*	0.06	−0.09*	0.06
	(0.05)	(0.10)	(0.05)	(0.09)
Fraction residing < 1 year	0.38*	1.40*	0.29*	1.20*
	(0.11)	(0.21)	(0.11)	(0.19)
Nonprofit * fraction residing < 1 year	0.09	0.70*	0.23	0.60*
	(0.19)	(0.35)	(0.20)	(0.32)
Government * fraction residing < 1 year	0.70*	−0.14	0.36	−0.21
	(0.21)	(0.39)	(0.22)	(0.37)
Located in an MSA	0.09	−0.16	0.07	−1.01*
	(0.09)	(0.14)	(0.09)	(0.13)
Annual price (log)	−0.78*	−1.21*	0.03	−0.52
	(0.33)	(0.55)	(0.33)	(0.51)
Average income (log)	0.12	0.73	0.15	−0.18
	(0.30)	(0.57)	(0.31)	(0.53)
Constant	−7.67*	−7.91*	−8.23*	18.23*
	(2.14)	(3.66)	(2.19)	(3.41)
Nonprofit effect	0.24*	0.32	0.28*	0.37*
	(5.47)	(2.62)	(7.11)	(3.92)
Government effect	−0.51*	−0.54*	−0.48*	−0.43
	(10.62)	(3.43)	(8.86)	(2.49)
Minimum distance R^2	0.09	0.06	0.07	0.07
Minimum distance χ^2	551.33	162.61	530.14	206.18
Sample size	3605	2433	3605	2433

Robust standard errors in parentheses; numbers under ownership effects are Wald statistics. All models contain fixed and year effects.

*Significant at the 10% level or better.

higher than that of a comparable for-profit after controlling explicitly for supply-side measures of bed availability. The ownership effects are all significantly different from zero. Thus estimated ownership effects cannot be attributed exclusively to differences in bed turnover and bed capacity.

Downloaded from https://academic.oup.com/jleo/article-abstract/21/1/228/883711
by DIP.ECONOMIA BIBLIOTECA COGNETTI DE MARTIIS UNIVERSITA STUDI DI TORINO user
on 12 January 2018

5.3. Does Religious Affiliation Drive the Nonprofit Effect?

It is conceivable that a nursing home's religious affiliation is important to a prospective resident, either because the resident prefers to live with others who share her values or beliefs, or—when monitoring problems are present—because the resident is more willing to trust organizations with religious affiliations over those without religious affiliations. If this is the case, then a "religious effect" may actually be driving the nonprofit effect documented above.

To check this I reestimated the models with nonprofit status disaggregated into "religious nonprofit" and "secular nonprofit." Table 7 reports the resulting ownership effects for a subset of these models. The first three columns provide results from the structural model with instruments and fixed effects; the last two columns provide results from the reduced-form model (using end-of-year data), also with instruments and fixed effects. Note that in all cases, positive—and nearly always significant—effects are measured for both religious and secular nonprofits, with the religious effect being larger. For example, the results of the conditional (nonnested) logit in the first column indicate religious and secular nonprofit ownership effects of 4.0 and 2.9 percentage points, respectively. In the one specification in which the secular nonprofit effect is insignificant, it remains comparable in magnitude to the significant effects from other models. The estimated government effects are comparable to those presented earlier.

The Wald statistic toward the bottom of the table tests the equivalence of the religious nonprofit and secular nonprofit effects and is distributed according to the chi-square distribution with one degree of freedom. In spite of the consistently larger religious effects, in no specification is the hypothesis that the religious and secular effects are the same rejected. The evidence from the table

Table 7. Disaggregation of Nonprofits

	Latent utility model			Reduced-form model	
	(i) Simple	(ii) Nested	(iii) NP/FP markets	(iv) Private payers	(v) Market share
Religious Nonprofit	0.42*	0.26*	0.71*	0.32*	0.37*
	(0.14)	(0.07)	(0.14)	(6.05)	(7.65)
Secular Nonprofit	0.30*	0.16*	0.55*	0.19	0.23*
	(0.12)	(0.06)	(0.11)	(2.61)	(3.48)
Government	−0.37*	−0.36*		−0.51*	−0.47*
	(0.15)	(0.07)		(10.51)	(8.75)
Wald statistic	0.46	0.32	0.68	0.56	0.67
Minimum distance R^2	0.09	0.21	0.04	0.09	0.07
Minimum distance χ^2	371.81	1225.42	1549.82	550.46	529.13
Sample size	3605	3605	2368	3605	3605

Robust standard errors are in parentheses for the latent utility models; for the reduced form models, numbers in parentheses are Wald statistics. All specifications are IV and estimated with firm and year fixed effects. The dependent variable is the log of the ratio of firm market share to outside good market share in columns (i)–(iii), the log of private payers in column (iv), and the log of within-county market share in column (v). Market shares are constructed based on the number of SNF private-payer residents on Dec. 31.

*Significant at the 10% level or better.

Downloaded from https://academic.oup.com/jleo/article-abstract/21/1/228/883711
by DIP.ECONOMIA BIBLIOTECA COGNETTI DE MARTIIS UNIVERSITA STUDI DI TORINO user
on 12 January 2018

strongly indicates that the more general nonprofit effect is not being driven by a consumer preference for religious organizations.

5.4. Sensitivity Analyses

Variations on the specifications presented above were also estimated. Among the variations estimated were models that omitted fixed effects, models that used contemporaneous rather than lagged regressors, and models that used different measures of staffing. The estimated ownership effects for all models estimated were generally similar in both magnitudes and statistical significance to those reported in the tables: Nonprofit effects were positive and government effects were either negative or zero.[22]

I ran an additional set of regressions to check on the possibility that new entrants in a given market and year could bias results in a capacity-constrained environment. New nursing homes have greater capacity to admit private payers and therefore may have abnormally high market shares of private payers in their first year for supply-side reasons. The use of end-of-year market shares instead of admissions market shares helps to inoculate against this problem, but as an additional control I (1) reestimated the nonnested structural model after omitting any markets with a new nursing home and (2) reestimated the reduced form models after adding a dummy variable indicating whether the nursing home was in its first year of operation. In both models, the results for nonprofits were little changed from the results reported in the tables. The estimated government effects continued to be either negative or zero.

6. Discussion

The results are highly consistent across specifications and reveal that both types of nonprofit-have larger market shares than do for-profits, while government nursing homes have the lowest market shares, ceteris paribus. These results are consistent with the interpretation that the market share differentials reflect a consumer preference for nonprofits over for-profits, and for for-profits over government homes, although two specifications did indicate a positive effect for government ownership. From a welfare standpoint, the estimated values of the indirect utility function suggest a substantial willingness to pay for nonprofit status. As an example, consider a private payer receiving skilled nursing care in a nonprofit nursing home in a mixed market and paying the average price of $47.48 per day. Given the option of being moved from the nonprofit facility to a for-profit home or paying to remain at the nonprofit, the typical resident would be willing to pay up to $2072 per year to remain at the nonprofit at median income levels.[23] That is, the equivalent variation associated with moving

22. More complete results are available upon request.

23. All figures are in constant (1982–1984) dollars. Note that the differences in estimated effects across specifications imply that calculations of welfare effects will be sensitive to the specification used.

Downloaded from https://academic.oup.com/jleo/article-abstract/21/1/228/883711
by DIP.ECONOMIA BIBLIOTECA COGNETTI DE MARTIIS UNIVERSITA STUDI DI TORINO user
on 12 January 2018

a resident from a nonprofit to a for-profit is $2072, or roughly 6% of median income. In a similar fashion, one could ask what price differential between nonprofits and for-profits would induce switching: the nonprofit would have to raise its price by $3.16 per day, or 6.6%, before the resident would become indifferent between staying and switching to a for-profit.

The strong preference for nonprofit nursing homes over for-profits might seem to suggest that many prospective residents will avoid for-profit and government nursing homes and simply choose between nonprofits and home health care (the model's "outside good"). In fact, this does not appear to be the case. Consider the simple logit model as estimated in column (ii) of Table 3, which predicts that, when home health care is considered, nonprofit nursing homes serve 7.68% of the typical county market for long-term care, followed by for-profits (2.65%) and government facilities (2.49%); the market share of home health care is 87.18%. Now suppose that all nonprofit nursing homes were to convert to for-profit status. The model predicts that for-profit market share would rise to 8.35%, government market share would increase to 2.54%, and home health care market share would increase to 89.11%. That is, 74% of those who had previously lived at nonprofit nursing homes would, in the absence of nonprofits, live at a for-profit, 25% would switch to home health care, and less than 1% would switch to government facilities. This last finding suggests that nonprofit and for-profit nursing homes are closer substitutes for each other than either is for government nursing home care.

The primary implication of the findings reported here is that ownership type appears to matter to consumers. The results cast doubt on the arguments that ownership type is irrelevant or unknown to individuals making purchases in mixed markets. If consumers did not know or care about the ownership type of producers, then one would expect them to purchase randomly across different ownership types, all things being equal. While it does appear that consumers value nonprofit status, however, the reasons for this preference are not entirely clear: The positive nonprofit effect in the nursing home industry may be the result either of the signal value of nonprofit status or of systematic product differentiation between nonprofits and other ownership types. Both explanations suggest that nonprofits can enhance social welfare—either through facilitating trade and lowering transaction costs (the signaling explanation) or increasing variety (the product differentiation explanation)—in ways that for-profits cannot. That is, if for-profits were credible sellers that could differentiate their products in the same ways that nonprofits do, then one would not expect to observe a distribution of market shares that consistently favors nonprofits.[24]

24. One possible counter to this line of argument is that, for historical reasons, nonprofits may have been the first movers, which could lead to systematic product differentiation that is correlated with nonprofit status nominally, but bears little actual relation to the nonprofit organizational structure. (That is, one might argue that for-profits could have produced the same outputs that the nonprofits do if the for-profits had entered the market first.) The data employed in this article do not permit an analysis of this possibility, but greater evidence on this point would be of interest. I am skeptical of the merit of the first-mover argument here, given the for-profits' traditional dominance in the nursing home industry.

Downloaded from https://academic.oup.com/jleo/article-abstract/21/1/228/883711
by DIP.ECONOMIA BIBLIOTECA COGNETTI DE MARTIIS UNIVERSITA STUDI DI TORINO user
on 12 January 2018

Traditional theories of the signal value of ownership types—which suggest that consumers prefer those organizations that are bound by a nondistribution constraint to those that are not whenever quality is nonverifiable—are inadequate to explain the result that government nursing homes have lower market shares than for-profits, all things being equal. A product differentiation story may be more plausible. To the extent that nursing homes reject applications for admission when prospective residents have insufficient private funds, government nursing homes may act as a safety net for Medicaid patients, admitting those who could not gain admission elsewhere. Such an access-oriented mission may be pursued at the expense of certain costly dimensions of output quality that the consumer observes (and values), but are not recorded in the data. Under such circumstances, private payers may elect to avoid government nursing homes in favor of other ownership types.

The evidence presented here does not support the contention that consumer preferences for religious nonprofits drive the more general nonprofit effect; this finding is consistent across specifications. One might expect, a priori, that religious nonprofits would fully account for any general nonprofit effect for two reasons. First, if prospective residents use the name of the nursing home to infer ownership type, it is generally easier to identify religious nonprofit status (e.g., St. Mary's) than secular nonprofit status (e.g., Whispering Pines), which may be indistinguishable by this name recognition method from for-profit status (e.g., Whispering Oaks). Second, if prospective residents are concerned about being exploited, they may place their trust in an organization that they believe shares their religious values, and not in the nondistribution constraint. Both lines of reasoning suggest positive ownership effects for religious nonprofits only. In fact, estimated effects for secular nonprofits were consistently positive and statistically equivalent to the estimated effects for religious nonprofits. Thus, to the extent that buyers use ownership type as a proxy for nonverifiable quality, buyers appear to trust (and recognize) both secular and religious nonprofits.

6. Conclusion

The analysis presented here shows that, after controlling for differences in bed capacity, bed turnover, price, location, and quality, market share for nursing homes in the state of Wisconsin is highest for nonprofits and lowest for government nursing homes, with for-profits occupying an intermediate position. The results imply that ownership type does appear to matter to consumers, and theories of ownership type based on the presence of nonverifiable quality find some support in the consistently positive nonprofit effects estimated here. Whether the estimated nonprofit effect is the result of signals of nonverifiable quality or of verifiable product differentiation, the results suggest in either case a consumer preference for the types of output that nonprofits produce, which in turn suggests that nonprofits serve a valuable purpose by providing outputs that are not available in the for-profit sector. The case of government nursing homes is more complex. Government nursing homes cannot distribute their profits, but if there is any positive signal value associated with this fact, it

Downloaded from https://academic.oup.com/jleo/article-abstract/21/1/228/883711
by DIP.ECONOMIA BIBLIOTECA COGNETTI DE MARTIIS UNIVERSITA STUDI DI TORINO user
on 12 January 2018

is more than offset by other considerations that, for nearly all of the models estimated here, result in either negative or insignificant ownership effects. While these effects generally suggest that private-payer consumers prefer private nursing homes to government facilities, the latter may still play a social role as a safety net for those lacking private funds who may find it difficult to be admitted elsewhere. In other words, while the results do not find support for the argument that government nursing homes enhance welfare by providing a product that is demanded by private payers and yet not supplied by the private sector, government facilities may increase welfare in other ways not studied here. It would be of interest to learn the extent to which government nursing homes do indeed admit sicker or poorer residents that had previously been turned away at private facilities.

Of additional interest is the extent to which the nonprofit effect has changed in recent years with the formation of watchdog organizations that monitor and "grade" nursing homes. If the nonprofit effect reflects a signal of nonverifiable quality, then the collection and dissemination of information that is otherwise costly to obtain should correspond to a decline in the nonprofit effect, as individual nursing home reputations become tied more closely to the monitors' reports and less to ownership type. While the nonprofit effect in the nursing home industry would be weakened in such circumstances, it would still be possible for nonprofit status to play a socially valuable role as the guarantor of the integrity of the monitoring organizations. In contrast, if this effect is due solely to systematic differentiation in verifiable product attributes, then an increase in information disseminated by monitors would not influence the nonprofit effect.

References

Alchian, Armen A., and Harold Demsetz. 1972. "Production, Information Costs, and Economic Organization," 62 *American Economic Review* 777–95.

Ballou, Jeffrey P. 2000. "The Role of the Not-for-Profit Firm in the Mixed Industry: Three Empirical Analyses of the Long-Term Care and Hospital Industries," Ph.D. dissertation, Northwestern University.

———. 2003. "Entry and Firm Location in Mixed Industries: Examining the Impact of Ownership Type on Entry Decisions in Long-Term Care," Working Paper 02–35, Northwestern University.

Basmann, Robert L. 1960. "On Finite Sample Distributions of Generalized Classical Linear Identifiability Test Statistics," 55 *Journal of the American Statistical Association* 650–59.

Binstock, Robert H., Leighton E. Cluff, and Otto von Mering. 1996. *The Future of Long-Term Care*. Baltimore: Johns Hopkins University Press.

Berry, Steven T. 1994. "Estimating Discrete-Choice Models of Product Differentiation," 25 *Rand Journal of Economics* 242–62.

Berry, Steven T., James A. Levinsohn, and Ariel Pakes. 1995. "Automobile Prices in Market Equilibrium," 63 *Econometrica* 841–90.

Cardell, N. Scott. 1997. "Variance Components Structures for the Extreme-Value and Logistic Distributions with Application to Models of Heterogeneity," 13 *Econometric Theory* 185–213.

Chamberlain, Gary. 1982. "Multivariate Regression Models for Panel Data," 18 *Journal of Econometrics* 5–46.

Easley, David, and Maureen O'Hara. 1983. "The Economic Role of the Nonprofit Firm," 14 *Bell Journal of Economics* 531–38.

Downloaded from https://academic.oup.com/jleo/article-abstract/21/1/228/883711
by DIP.ECONOMIA BIBLIOTECA COGNETTI DE MARTIIS UNIVERSITA STUDI DI TORINO user
on 12 January 2018

Fraundorf, Kenneth. 1977. "Competition and Public Policy in the Nursing Home Industry," 11 *Journal of Economic Issues* 601–34.

Glaeser, Edward L., and Andrei Shleifer. 2001. "Not-for-Profit Entrepreneurs," 81 *Journal of Public Economics* 99–115.

Hansmann, Henry B. 1980. "The Role of Nonprofit Enterprise," 89 *Yale Law Journal* 835–01.

Mauser, Elizabeth. 1993. "Is Organizational Form Important to Consumers and Managers: An Application to the Day-Care Industry," Ph.D. dissertation, University of Wisconsin.

McFadden, Daniel L. 1978. "Modeling the Choice of Residential Location," in A. Karlqvist, et al., eds., *Spatial Interaction and Planning Theory Models*. Amsterdam: North-Holland.

Nevo, Aviv. 2001. "Measuring Market Power in the Ready-to-Eat Cereal Industry," 69 *Econometrica* 307–42.

Nyman, John A. 1989. "The Private Demand for Nursing Home Care," 8 *Journal of Health Economics* 209–31.

Scanlon, William J. 1980. "A Theory of the Nursing Home Market," 17 *Inquiry* 25–41.

Shleifer, Andrei. 1998. "State versus Private Ownership," 12 *Journal of Economic Perspectives* 133–50.

Sloan, Frank A. 1988. "Cost of Capital to the Hospital Sector," 7 *Journal of Health Economics* 25–45.

Spence, Denise A., and Joshua M. Wiener. 1990. "Estimating the Extent of Medicaid Spend-Down in Nursing Homes," 15 *Journal of Health Politics, Policy and Law* 607–26.

Weisbrod, Burton A. 1988. *The Nonprofit Economy*. Cambridge, MA: Harvard University Press.

———. 1998. "Institutional Form and Organizational Behavior," in W. Powell and E. S. Clemens, eds. *Private Action and the Public Good*. New Haven, CT: Yale University Press.

Wiener, Joshua M., Laurel H. Illston, and Raymond J. Hanley. 1994. *Sharing the Burden: Strategies for Public and Private Long-Term Care Insurance*. Washington, D.C.: Brookings Institution.

Downloaded from https://academic.oup.com/jleo/article-abstract/21/1/228/883711
by DIP.ECONOMIA BIBLIOTECA COGNETTI DE MARTIIS UNIVERSITA STUDI DI TORINO user
on 12 January 2018