# Entry and Firm Location in Mixed Industries: Examining the Impact of Ownership Type on Entry Decisions in Long-Term Care

**(Job Market Paper)**

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**05 November 2002**

**Abstract**

When standard profit maximizers and alternative firm types—such as nonprofits, government organizations, or cooperatives—compete in the same industry, their coexistence may be explained either by a lack of meaningful distinctions in outputs across types, or by systematic product differentiation between the two types coupled with a cost advantage for alternative types. This study develops the implications of each of these explanations of the mixed industry for observable patterns of firm entry and tests competing explanations of coexistence. It argues that the relevant test of whether alternative types should receive the preferential government treatment that is often accorded to them turns on whether these types produce outputs that are socially valuable but unprofitable for standard profit maximizers to produce. In the empirical section, I use data from rural markets in the United States to examine whether nonprofit nursing facilities enter markets that for-profit firms cannot profitably enter, thereby expanding access to nursing care to populations that would not otherwise be served. This study also addresses the broader, related question of the ways in which the markets that nonprofit firms enter differ from those that for-profit firms enter. The results of the models show that nonprofit firms typically do not enter markets that differ from markets entered by for-profits. Consistent with prediction, however, government nursing homes are more likely to enter markets that are unprofitable, as characterized by their relatively low populations. Based on patterns of entry, this study does not find evidence of a clear cost advantage for nonprofits over for-profits, despite the tax advantages conferred upon nonprofit firms.

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**I. Introduction**

Mixed industries are industries in which the standard neoclassical firm—i.e., a firm which maximizes profits and is owned by the providers of capital—coexists and potentially competes with some alternative type of producer that differs from the neoclassical firm either in terms of its organizational or operating constraints, or in terms of its objectives. Alternative types include ecclesiastical and governmental organizations, nonprofit firms, cooperatives, and hobbyist entrepreneurs, among others, with various subsets of these types competing against neoclassical rivals in a wide variety of mixed industries in the United States, such as hospitals, financial services, package shipping, education, day care, and wineries. Previous authors (e.g., Schiff and Weisbrod 1991) have speculated that when different types of firms compete in the same industry, the low-cost type will ultimately dominate, presumably by setting low prices that force rival types to exit. That this has not happened even after long periods of time in many mixed industries suggests the possibility that the mixed industry configuration is a long-run equilibrium. This study analyzes the relationship between different possible explanations of mixed industry equilibrium and the observable conduct of different types, and tests competing explanations by examining patterns of entry of private nonprofit and for-profit nursing homes in the rural United States.

The mixed industry may persist in the long run for either of two reasons. First, any differences across firm types may be nominal, with no meaningful operational differences underlying them and resulting in no systematic differences in outputs across types. For example, an employee-owned firm that seeks to maximize total employee income will distribute its profits differently from the neoclassical firm but will not differ operationally or in terms of product strategies, other things equal, since both types will seek to maximize profit. Second, the alternative type may produce outputs that are in demand but neoclassical firms cannot profitably produce. This requires that the alternative types have a cost advantage over at least a subset of potential outputs, which may arise from within the firm—as when the entrepreneur subsidizes production with her own wealth—or outside the firm—as when governments confer tax-exempt status on nonprofits. When the alternative type has a global cost advantage and can produce *all* outputs more inexpensively than the neoclassical type can, the industry will be mixed if the low-cost alternative types pursue objectives other than profit that preclude them from entering all profitable markets or market niches, or if the capacity of such firms taken together is fixed and falls short of demand. I examine these arguments in greater depth in the second section.

In order to distinguish between these two explanations of the mixed industry, one must ask upon observing an alternative type occupying a particular market or market niche whether a neoclassical type would enter and produce a comparable output if the alternative type were to exit. That is, is the market or niche unprofitable, or is the alternative type there simply because it entered first? In stylized models of product differentiation, firms may distinguish their outputs from those of their rivals either within markets—e.g., by producing different qualities—or across markets—i.e., by entering physically different markets. In the empirical component of the study, I focus on the latter possibility, analyzing patterns of entry of tax-exempt nonprofit (alternative) and nonexempt for-profit (neoclassical) nursing homes in the rural United States and asking whether nonprofit firms systematically enter markets that are unlikely to be profitable for for-profits or markets that otherwise differ from those that for-profits enter. A finding that they do would suggest that the second explanation for the mixed industry (i.e., differentiation across neoclassical and low-cost alternative types) is valid in the case of nursing homes, with alternative types entering markets that neoclassical firms cannot afford to enter or are most consistent with nonprofit objectives. If nonprofits lack a cost advantage, however, they will be unable to enter any market that a for-profit cannot profitably enter. Since governmental organizations may have especially soft budget constraints (Kornai 1986), they may be particularly likely to enter unprofitable markets; I analyze them separately from the private nonprofit and for-profit firms for purposes of comparison.

In developing the empirical models, I assume that patterns of neoclassical entry reveal market profitability in that these types will seek to enter all markets that are profitable and will not enter any markets in which they expect to lose money. For the purposes of this paper, a market is considered to be profitable if there exists a neoclassical firm with a cost function such that the expected discounted profits from a monopoly position in that market are positive. In the empirical analysis I define market profitability with respect to for-profit nursing homes and model profitability as a function of several variables, including population, population density, and per capita income. Based on the analysis of neoclassical entry, market profitability can be predicted for those markets in which alternative types operate. In order to address the question of whether alternative types enter unprofitable markets, I test whether the probability that markets occupied by an alternative type are profitable is statistically lower than the probability that markets entered by a single neoclassical firm are profitable. In order to address the question of whether neoclassical and alternative types enter different markets generally, I use standard discrete choice models to compare the market characteristics of markets entered by neoclassical firms and markets entered by alternative firms. The empirical models are outlined in section three, followed by a discussion of the data and estimation results in the fourth and fifth sections, respectively.

The policy implications of the two explanations for the mixed industry are very different. If differences in firm conduct across types are nominal, it may be argued that neoclassical and private alternative firms should be treated identically with respect to the granting of tax exemptions and other preferential government treatment and the application of antitrust regulation. If alternative types pursue goals that are privately unprofitable but socially valuable, however, government subsidies that encourage the production of alternative type outputs may increase welfare. In the case of the present analysis, to the extent that the provision of financial incentives such as tax exemptions lowers the costs of the nonprofit nursing home, tax exemptions expand the set of markets that that firm can profitably enter and may therefore contribute to an expansion of access to care in rural areas. Put another way, if providing or encouraging the provision of long-term care to the rural elderly is a policy goal, policy makers need to know whether the repeal of tax exemptions for nonprofit nursing homes will result in nonprofit exit from rural markets. They may also want to know whether entry by for-profits can be expected to offset nonprofit exit. While statewide referenda on whether to remove tax exemptions have been soundly defeated (Colorado's referendum in 1996 is one example), the fact that the removal of exemptions has been actively considered and voted on suggests that evidence on the benefits and costs of granting exemptions is increasingly germane. In addition to discussing the implications of the findings for analyses of the mixed industry in the discussion and concluding sections, I address the policy implications of the findings as well as discussing the caveats to and limitations of this study.

## II. The relationship between costs, objectives, and entry in the mixed industry

A mixed industry configuration can be sustained if both neoclassical and alternative firm types engage in similar conduct and produce similar outputs. This is a trivial explanation, since it effectively says that firm type does not matter. The mixed industry can also be sustained if alternative types are low-cost firms that can produce outputs that are unprofitable for neoclassical firms, as long as alternative supply is scarce or the alternative type's objectives are not conducive to entry in all profitable markets. If alternative supply is large and alternative types behave as profit maximizers, they will drive the higher cost neoclassical types out of the market by producing both profitable and unprofitable outputs, and the industry will not be mixed. If alternative supply is scarce, however, then high-cost neoclassical types capture residual demand or fill unoccupied niches, regardless of alternative objectives. And if alternative objectives preclude alternative types from entering all profitable markets and market niches, then neoclassical types will enter even if alternative supply is not scarce. Thus, distinguishing between the trivial and differentiation explanations of the mixed industry involves determining whether alternative types are low-cost firms, which this study seeks to do based upon observable patterns of neoclassical and alternative entry. In this section, I derive conditions on costs and objectives that are necessary, and in some cases sufficient, for alternative entry into unprofitable markets.

### *Costs and entry*

I assume that the pool of prospective entrants comprises both neoclassical and alternative types, where types are exogenously determined.[1] Consider the typical neoclassical entrant, whose profits are given by $\pi(\mathbf{x} \mid N)$—where $\mathbf{x}$ is a *K*-vector in the convex space $\mathbf{X}$ representing feasible market conditions and $N$ is the number of incumbents—and the typical alternative entrant with profits of $\pi^A(\mathbf{x} \mid N)$. The $A$ superscript represents the firm's "alternative" status and reflects the possibility that alternative types have a different cost function than neoclassical types. Market conditions may include population, average wealth and income of residents, and labor costs, among others. I assume that profit is monotonic in each market condition.

Suppose that the prospective alternative entrant is an entrepreneur with a decision function $u(\mathbf{x})$, $u : \mathbf{X} \to \Re$, which is maximized over $\mathbf{x}$ subject to a nonnegative profit constraint. The neoclassical firm enters a market if and only if the entrant's profits are positive, given the current number of incumbents. The alternative entrepreneur enters if and only if $\pi^A(\mathbf{x} \mid N) \geq 0$ and $u(\mathbf{x} \mid N) > u_0$.[2] In order to abstract from potential differences in strategic behavior across types and focus solely on entry, I analyze only those markets for which $N$=0.[3] For the purposes of this paper, an unprofitable market is defined as a market for which $\pi(\mathbf{x} \mid 0) < 0$, with $\pi(\mathbf{x} \mid 0)$ and $\pi^A(\mathbf{x} \mid 0)$ henceforth abbreviated as $\pi(\mathbf{x})$ and $\pi^A(\mathbf{x})$, respectively. Note that an unprofitable market is defined with respect to neoclassical types; a low-cost alternative type could conceivably enter an unprofitable market.

Suppose that an alternative type enters an unprofitable market, $\mathbf{x}_0$. It follows immediately that $\pi^A(\mathbf{x}_0) > \pi(\mathbf{x}_0)$. That is, the alternative type has a local cost advantage, which may or may not extend beyond market $\mathbf{x}_0$. The converse—which asks whether alternative types with a cost advantage enter unprofitable markets—is of more relevance to policy makers who are interested in knowing whether conferring special treatment (such as tax exemptions) on alternative types indirectly enhances social welfare. The answer is generally no: The existence of a local cost advantage for the alternative entrepreneur need not imply entry into an unprofitable market.[4] Whether a global cost advantage—such that $\pi^A(\mathbf{x}) > \pi(\mathbf{x})$ for all $\mathbf{x} \in \mathbf{X}$—is sufficient to induce alternative entry into unprofitable markets will depend on the objective function of the alternative firm.

*Objectives and entry when the supply of low-cost alternative output is large*

In asking which objectives are compatible with alternative entry into unprofitable markets in the presence of a global cost advantage, I consider here a variety of objectives frequently attributed to alternative types: output maximization, profit maximization, prestige maximization, access maximization, quality maximization, and quality satisficing.

Suppose that the alternative entrepreneur has preferences over output quantity, output quality, profits, and market conditions. Let $u(\mathbf{x}) = \max_{q,y} v(q, y, \pi^A(q, y; \mathbf{x}); \mathbf{x})$, where $q$ is quality and $y$ is output quantity, and let $q^A(\mathbf{x})$ and $y^A(\mathbf{x})$ characterize the alternative type's optimal choices of quality and quantity, respectively, for any set of market conditions **x**. (The neoclassical type's optimal choices are denoted analogously but without the $A$ superscript.) Consider first the class of objective functions that is characterized by an indifference to quality ($v_q \equiv 0$). The low-cost alternative entrepreneur who maximizes output and is happier producing than not producing will enter any market in which she can earn nonnegative profits, including unprofitable markets. Similarly, an alternative type that maximizes profits will seek to enter all markets for which $\pi^A(\mathbf{x} \mid N) > 0$. Entrepreneurs may also have preferences over the market conditions **x**. Some entrepreneurs may exhibit prestige-seeking behavior, which may be positively associated with market profitability, and seek affluent, highly visible markets to enter, eschewing unprofitable markets even with a cost advantage. By contrast, the access-oriented entrepreneur, who desires to serve the poor or other disadvantaged groups, actually seeks out unprofitable market conditions, entering any unprofitable market that she can afford to enter.

Now consider the class of objective functions for which $v_q > 0$. To the extent that the level of quality that can be profitably produced increases with profitable market conditions, quality maximizers will enter the most profitable markets and may or may not enter less profitable or unprofitable markets, depending on their willingness to produce low-quality outputs. Low-cost entrepreneurs who want to ensure that a minimum level of quality is provided—i.e., $v(q_0, y_0, \pi_0^A; \mathbf{x}) > u_0$ for some level of quality $q_0$ and quantity $y_0$ implies that $v(q_0, y, \pi^A; \mathbf{x}) > u_0$ for *any* positive values of $y$ and $\pi^A$—will enter both profitable and unprofitable markets if a number of technical assumptions hold. (The proof is provided in the appendix.) The intuition behind this "quality-satisficing" result is that for any preferred level of quality for an alternative entrepreneur in one market, there exists another, less profitable market where that same quality maximizes the neoclassical firm's earnings at zero. For example, this less profitable market may have a more affluent clientele but higher labor costs, leading to an increase in optimal quality but lower profits. Earnings are still positive for the alternative type in this less profitable market (as a result of the cost advantage), as is output. The quality satisficer is therefore willing to enter both that market and slightly less profitable markets in which for-profit earnings are negative.

Even though many objective functions are consistent with alternative entry into unprofitable markets, if there is no scarcity of alternative supply then maximization of profit, output, or potentially quality is inconsistent with a stable mixed industry configuration, as low-cost alternative types will drive neoclassical types out of the market. A configuration of access-oriented types, which seek less profitable market conditions, and neoclassical types, which seek more profitable market conditions, can be sustained, however.

*Objectives and entry when the supply of low-cost alternative output is scarce*

It is often assumed that alternative capacity is finite (e.g., Lakdawalla and Philipson 1998). Scarcity implies that low-cost alternative entrepreneurs choose which markets to enter and may choose only the most profitable ones. Under plausible assumptions, $q^A$, $y^A$, and $\pi^A$ all increase in market profitability.[5] If alternative types care strongly about quality, output, or profits, they will enter super-profitable markets, i.e., those markets in which profits are substantially above zero even for for-profit firms; the higher-cost for-profit firms will fill the remaining profitable markets. Scarcity of alternative supply suggests that a mixed industry configuration is consistent with any one of the alternative type objective functions discussed above.

In summary, a cost advantage is necessary but not sufficient to induce alternative types to enter unprofitable markets. If alternative objectives are consistent with entering unprofitable markets, however, a cost advantage is sufficient to ensure this result.

## III. Estimation and prediction

The question of whether alternative firm types enter markets that are likely to be unprofitable relies for its answer on the ability to identify those markets that are profitable to enter and those that are not. I use neoclassical patterns of entry to address this issue. The comparison that one would ideally like to make asks whether, for a given market in which a single alternative monopolist operates, a neoclassical monopolist would operate in that same market if the alternative type were not there. Unfortunately, this comparison does not present itself in the real world. As a result, the strategy is to ask whether neoclassical firms enter markets that are similar to those that alternative firms have entered.

Assuming no barriers to entry, when one observes an empty market—i.e., a market with no firms—then one can reasonably conclude that this market is not profitable; otherwise, a neoclassical type would have entered to capture those profits. Likewise, when one observes a neoclassical firm operating in a market, it is reasonable to assume that that market is profitable for one firm. When one observes a single alternative type operating in a market, however, either of two explanations may be correct. The first is that the market is unprofitable, but there exists an alternative type with a cost advantage that enables it to operate profitably in the market.[6] The second possible explanation is that alternative types do not generally have any financial advantage and that they enter only profitable markets. In this case, the market is profitable enough for one firm but not profitable enough for two firms, and the alternative type occupies the market only because it entered first. This section of the paper derives a strategy for distinguishing between these two explanations.

The present value of profits of neoclassical firm *i* is a latent variable (designated by $\pi_i$), which is the sum of a deterministic function and a random component drawn from a distribution *G*:

$$\pi_i(\mathbf{x}) = \pi(\mathbf{x};\theta) + \varepsilon_i,$$

where $\theta$ is a vector of parameters. The random component captures unobserved differences profit functions that are assumed to be uncorrelated with market characteristics. This includes differences in technology across firms that make a given market profitable for one firm but not for another. I assume that the unobservable component of profits is drawn from a distribution with unbounded support, so it is not possible to empirically identify a profitable market: With a sufficiently high draw of $\varepsilon$, any market can be profitable. For the purposes of the empirical work, I therefore define a market that is "likely to be profitable" as a market for which $\Pr\{\pi_i(\mathbf{x}) > 0\} > 0.5$.[7]

Neoclassical firm *i* enters market $\mathbf{x}$ if and only if $\pi_i(\mathbf{x}) > 0$. While profits are not observed, entry—denoted by the indicator variable *w*—is observed. The probability that any given firm *i* drew a sufficiently large $\varepsilon$ to enter market $\mathbf{x}$ is given by the standard binary choice model:

$$\Pr(w_i = 1) = \Pr(\pi_i(\mathbf{x}) > 0) = 1 - G(-\pi(\mathbf{x})). \tag{1}$$

In the basic model of nursing home entry, regulatory barriers to entry (discussed in the next section) are modeled as fixed costs. An alternative formulation models regulatory barriers to entry separately, and is also estimated below. In this second model, a potential monopolist assesses the profitability of the market and then applies to the state for permission to enter. The probability of entry by a neoclassical firm is then the probability that the market is profitable multiplied by the probability that permission to enter is granted, conditional on profitability:

$$\Pr\{w_i = 1\} = \Pr\{\pi_i(\mathbf{x}) > 0\} \Pr\{z_i = 1 \mid \pi_i(\mathbf{x}) > 0\}, \tag{2}$$

where *z* equals one if the state grants permission to enter and zero otherwise.

Market profitability is a function of many factors. I am particularly interested in market size, which is some function of the market's population and can be estimated. In general, firms will find it less profitable to enter small—i.e., lightly populated—markets, because this requires relying on fewer unit sales to cover fixed costs. A market's level of wealth is also of interest: Poor markets may be unprofitable, since the number of people who are willing to buy the output at a price that permits a profit to be earned may be relatively small.[8] Cost conditions (e.g., wage costs) and the demographic makeup of the local population (e.g., number of elderly residents) will also affect profitability, as discussed below in section IV. In order to focus on market size, I follow Bresnahan and Reiss (1990, 1991) and write profits as

$$\pi_i(\mathbf{x}) = (p_i - c_i(\mathbf{x}))s_i(p_i, \mathbf{x})M - F_i(\mathbf{x}),$$

where $p$ represents revenues per unit sold, $c$ represents per unit variable costs, $s$ is the proportion of the market that is willing to purchase at the profit-maximizing price, $M$ is the size of the market, and $F$ represents fixed costs. That is, profits are the product of a variable profit term, $V_i(\mathbf{x}) = (p_i - c_i(\mathbf{x}))s_i$, and market size, minus fixed costs.

The alternative entry decision is driven by both profits—given by $\pi_i^A(\mathbf{x}) = \pi^A(\mathbf{x}) + \varepsilon_i^A$—and the alternative entrepreneur's decision function—given by $u_i(\mathbf{x}) = u(\mathbf{x}) + \nu_i$—where $\varepsilon_i^A$ and $\nu_i$ are error terms. Note that alternative types may face a different deterministic profit function, a different distribution for the error term, or both. More importantly, since I assume that the decision function is unknown, it is not possible to estimate the parameters of $\pi^A(\mathbf{x})$ and assess the relative profitability of neoclassical and alternative types directly. Hence, the approach is necessarily indirect: I estimate the parameters of neoclassical profitability and use these parameters to predict whether the markets that alternative types enter are relatively unlikely to be profitable. [9]

More precisely, I specify profits as a parametric function of market conditions and estimate equation (1) using a probit specification and data on market conditions for those markets that either are occupied by a neoclassical monopoly ($w_i = 1$) or are empty ($w_i = 0$). With the parameter estimates in hand, estimated probabilities of both neoclassical and alternative entry as a function of market conditions are computed. These probabilities are compared in two different ways. First, I compute the probability of entry at the mean market conditions of the neoclassical monopoly and the corresponding probability of entry at the mean market conditions of the alternative monopoly and test whether these probabilities are statistically different from one another. A second comparison predicts the probability of profitability for each market entered by alternative firms and takes the average; likewise for the neoclassical firms. These averages can then be compared statistically.

As a check on the robustness of the results, I estimate the model under a variety of specifications and distributional assumptions, which are described in section V. As an additional check, I also split the sample of neoclassical markets into observations that are used for estimation and observations that are used for prediction. In general, I find that the main results are little affected by these changes. Since the ability to predict accurately is important in this study, when choosing which models to emphasize I focus on those that predict relatively well. I measure predictive success by comparing actual and predicted entry for each of the observations used in estimating the parameters, and computing the percentage of observations correctly classified by the model.

A second question of interest is whether and how the markets that alternative types enter differ from those that neoclassical types enter. I address this question in two ways. First, I consider only monopoly markets and estimate a probit model with the dependent variable equal to one if the incumbent is a neoclassical firm and zero if the incumbent is an alternative firm; the regressors are a set of market conditions. In addition to examining individual coefficients, I test the null hypothesis that all coefficients are jointly equal to zero, i.e., that neoclassical and alternative types enter similar markets. Second, I consider both monopoly and empty markets together and estimate a multinomial logit model, which generates a separate set of coefficients for each ownership type. I test whether the neoclassical coefficients are jointly equal to the alternative coefficients.

**IV. The nursing home industry in the rural U.S.**

Long-term care is growing in importance and visibility as the population ages, with over 12 million individuals in the U.S. requiring some form of long-term care. In 1998, one hundred billion dollars was spent on nursing home care alone, and $150 billion on nursing home care and home health care combined (Feder et al. 2000). Nursing home care is generally provided to elderly individuals who need assistance with one or more so-called activities of daily living, such as dressing or bathing. Nursing facilities are therefore highly labor intensive and rely largely on relatively low-skilled nurse aides to take care of residents. The costs of caring for roughly two-thirds of all nursing home residents are borne by Medicaid, making the government by far the largest buyer of nursing home care. Private payer fees constitute most of the balance of revenues.

The elderly in the rural U.S. can potentially receive nursing home care at one of three types of institutions: freestanding nursing homes, nursing homes that are affiliated with hospitals, and hospitals themselves. Regarding the latter, swing bed programs permit hospitals to use some of their beds as nursing care beds as a way of providing access to nursing care in rural counties where no nursing home is available. The conditions under which hospital entry occurs are undoubtedly different from those required for nursing home entry. Because it is not possible to separate nursing home and hospital entry conditions for nursing homes that are either affiliated with or contained within hospitals, this study analyzes the entry patterns of freestanding nursing homes only.

Of the nearly 17,000 nursing homes in the United States, roughly 26 percent are nonprofit (66 percent are for-profit). Nonprofit firms, as defined by section 501(c)(3) of the Internal Revenue Code, serve specific, listed charitable purposes and are subject to a nondistribution constraint, which prohibits these organizations from distributing their profits to any stakeholder, director, or manager. In return, nonprofits enjoy an exemption from federal and state income taxes and, frequently, from property taxes. Nonprofit organizations are also eligible to receive donations that are tax deductible, subject to certain limits, to the donor. This favorable tax treatment potentially confers a cost advantage on nonprofit firms, as the income tax exemption increases retained variable profits while the property tax exemption and availability of tax-deductible donations reduce fixed costs. Nonprofits also tend to have greater access to volunteers, which may lower labor costs. It is possible that the presence of the nondistribution constraint leads nonprofits to allocate resources inefficiently or face a higher cost of capital, which may partially or fully offset the tax advantage.

*The nature and effectiveness of barriers to entry*

The basic model, given by equation (1), assumes that nursing homes can enter markets freely. If nursing homes cannot do so, then the model estimates may overstate the extent to which markets are unprofitable, as some profitable markets may not be entered. If this is the case, then predictions of nonprofit entry behavior will be biased toward nonprofits entering unprofitable markets. It is generally acknowledged that economic barriers to entry are low, as successful entry does not require proprietary knowledge, start-up and capital costs are relatively low, the industry is labor intensive, and the labor hired is relatively unskilled (Norton 2000). Regulatory barriers to entry do exist in most states, however.

The National Health Planning and Resources Development act, passed by Congress in 1974, created the certificate of need (CON) program, which was designed to contain the cost of Medicaid programs at the state level by requiring health care organizations to receive state approval prior to building new facilities or expanding existing ones. While the federal legislation was repealed in 1986, many states left their CON laws in place. Some states imposed another cost containment measure, either in addition to or in lieu of the CON laws: a moratorium on the total number of long-term care beds in the state. In 1998, seven states had neither CON laws nor a bed moratorium in place (Harrington et al. 2000).

Thus, while entry in any of the seven states without either CON laws or a bed moratorium does in fact reflect free entry, barriers to nursing home entry existed in the remaining 43 states in the late 1990s. Neither type of barrier precluded entry entirely, however. Where CON is the only barrier, a health care organization that can effectively demonstrate the need for its services will have its application to enter a new market approved. There is a lag between the time when approval is first sought and the time when approval is granted, and there is no guarantee that an application will be approved, although approval rates have historically been high. Regarding bed moratoria, these often apply to all beds in the state, in some cases allowing an organization to take advantage of a reduction of beds in a declining market in order to increase the number of beds in a newly profitable one. Regarding the effectiveness of the moratoria and CON laws, research shows that these legal restrictions have limited but not halted the growth of bed supply (Norton 2000, Harrington et al. 1997). The larger point is that CON laws and bed moratoria make entry more difficult but not impossible. To the extent that cost containment issues are not as severe in rural markets or policymakers view these markets as under-served, regulatory barriers to entry may be lower for rural markets. For example, industry accounts suggest that exceptions to bed moratoria laws are more likely to be granted in rural markets.

As a rough preliminary check on the impact of CON legislation and bed moratoria on entry behavior in my sample (discussed further below), I ran a series of regressions of the number of nursing homes in a given county on the county's elderly population and dummy variables indicating whether the county is in a state with CON legislation or a bed moratorium. In general, the presence of regulatory barriers was a negative predictor of the number of nursing homes located in a given county, suggesting that the regulations do have some effect. However, when only counties with zero or one nursing home were considered (a superset of my sample), regulation was not a significant predictor of the presence of a nursing facility.

*Data*

I follow Bresnahan and Reiss (1990) in identifying and examining isolated towns, since firms in these towns are less likely to experience competition from firms in many other nearby towns. I considered the county seats of all counties in the U.S. with populations under 20,000 (a sample representing 1,052 counties out of a total of 3,066 counties in the U.S.). For these counties, county seats tend to be centrally located and among the larger towns in the area. I omitted any county seats that were located within twenty miles of another town of population 1,500 or more, leaving 461 counties to be included in the analysis.

Information on nursing home locations is available from the Online Survey, Certification, and Reporting (OSCAR) database, which is maintained by the Center for Medicare and Medicaid Services. All nursing homes located in any one of the 461 retained county seats were considered candidates for analysis. In addition to nursing homes located in the county seats, the OSCAR data indicated the presence of 140 nursing homes in retained counties that were not located in the county seat. The focus on county seats suggests that those nursing homes that are not located in a county seat and yet might compete relatively closely with those in the county seats should be included in the analysis. A nursing home is defined here as "relatively close" to a county seat if it is located within twenty miles of the county seat. Those nursing homes that were not relatively close to a county seat were omitted. Of the remaining 93 nursing homes that were relatively close to a county seat but not in the seat, an additional screening was performed to eliminate any nursing homes that were within twenty miles of a town of population greater than 1,500 (other than the county seat). This eliminated 35 additional nursing homes. Both nursing homes that are in county seats and those that are relatively close to county seats are considered to be in the same market. Table 1 provides summary statistics for the retained counties and nursing homes. The majority of nursing homes in retained counties are located in either monopoly or duopoly environments, and no retained county had more than four nursing homes. Unsurprisingly, counties that support more nursing homes tend to be larger and wealthier.

In addition to the location information, the OSCAR database contains other variables of interest to this study, the most important of which is the nursing home's ownership type: for-profit, nonprofit, or governmental. Other variables of interest include whether the nursing home is a member of a chain, and whether the nursing home is affiliated with a hospital. The results presented below omit any nursing homes that are affiliated with hospitals (which are largely nonprofit) since in such cases the profitability of the nursing home cannot be inferred independently of the hospital's profitability.

In order to avoid the complications introduced by strategic interaction and to minimize the likelihood that regulatory barriers will negatively impact entry, I limit the focus to markets that have either one nursing home or none. Observations for which the regressors took on missing or negative values were omitted (except for population growth rates, which were permitted to take on negative values). The final sample for analysis contained 111 empty markets, 77 markets with a for-profit monopoly, 53 markets with a nonprofit monopoly, and 37 markets with a government monopoly. Table 2 shows the distribution of county population and median household income across markets with zero and one nursing homes. While the population figures suggest a break-even population in the high two thousands, the income percentiles correspond quite closely across monopoly and empty markets and do not appear to suggest that incomes are lower in empty markets. Table 3 provides statistics by organizational form: For-profits tend to enter somewhat larger markets than do either nonprofits or government nursing homes, but for-profits also tend to enter markets with lower median household incomes.

A market's profitability depends on both demand and cost characteristics. Demand is related to the number of individuals in the market and their ability and willingness to pay for services. Data from the 2000 U. S. Census is employed to capture many features of nursing home market profitability, including county seat population, county population, population density, percent of residents who are over 65, percent of residents who are living alone, and percent of residents who are female. (In general, nursing homes residents tend to be disproportionately female, single, and elderly.) Median household income data are from the 1997 U.S. Bureau of the Census Small Area Income and Poverty Estimates. Proxies for costs were drawn from the 2000 Bureau of Labor Statistics' Covered Employment and Wages survey (average weekly wage) and the 1997 U.S. Census of Agriculture (average market value of farm land and buildings, per acre).

Descriptive statistics are in table 4. The first column provides means for the aggregated sample, and subsequent columns disaggregate by market status. Mean values for nonprofit- and government-occupied markets that differ statistically from those of for-profit markets are denoted with an asterisk. While mean conditions do not differ much between for-profits and nonprofit markets, markets occupied by a government nursing home tend to have higher incomes (*INCOME*) and smaller populations outside the county seat (*OTHERPOP*). All population and financial variables are expressed in thousands of units.

*Empirical specification*

Variable profits are hypothesized to be a linear function of $\mathbf{x}^V$, a matrix of market conditions including median household income (*INCOME*), the percentage of county residents who are female (*FEMALE*), the percentage of county residents over the age of 65 (*OVER65*), the percentage of county households with only one member (*SINGLE*), and average weekly county wages (*WAGE*). In alternative specifications, I substitute the percentage of households that is below the poverty level (*POVERTY*) for median household income. Fixed costs are hypothesized to be a linear function of $\mathbf{x}^F$, which includes a constant term, average county wages, and average land values per acre (*LAND*). The presence of certificate-of-need legislation (*CON*) and a bed moratorium (*MOR*) are regulatory barriers to entry that are modeled as fixed costs and hence are also included in $\mathbf{x}^F$. While the population of the county seat (*CITYPOP*) is a good first approximation of market size, I also permit market size to depend in part on the population of the county outside the county seat (*OTHERPOP*). In alternative specifications, the rate of population growth from 1990 to 2000 (*GROWTH*) is included in the specification of market size. Thus, the specifications for variable profits per consumer, market size, and fixed costs for firm *i* entering market **x** are, respectively:

$$V_i = \beta'\mathbf{x}^V + \eta_i^V$$

$$M = CITYPOP + \gamma OTHERPOP$$

$$F_i = \alpha'\mathbf{x}^F + \eta_i^F \,.$$

Note that, following Bresnahan and Reiss (1990), the coefficient on *CITYPOP* is constrained to equal one; market size therefore has units equal to the population of the town in which the nursing home is located. The latent variable model for profits is now given by:

$$\begin{aligned} \pi_i(\mathbf{x}) &= \left(\beta'\mathbf{x}^V + \eta_i^V\right) * \left(CITYPOP + \gamma OTHERPOP\right) - \alpha'\mathbf{x}^F + \eta_i^F \\ &= \beta'\mathbf{x}^V * \left(CITYPOP + \gamma OTHERPOP\right) - \alpha'\mathbf{x}^F + \left[\left(CITYPOP + \gamma OTHERPOP\right) * \eta_i^V - \eta_i^F\right] \end{aligned} \qquad (3)$$

The final term (in brackets) is the error term, which is heteroskedastic in market size. I estimate the model via maximum likelihood using a Newton-Raphson ridge method.

## V. Results

Estimates of the probit model using the latent profit specification in equation (3) are given in table 5. The most reliable predictors of profitability across the specifications estimated are population and the percentage of the population that is elderly. Coefficients on other demographic predictors, namely *FEMALE* and *SINGLE* are not significant, most likely due to the lack of substantial variation in these variables across markets. Somewhat more surprising is the insignificance of *INCOME*, which is robust across specifications. One plausible explanation for this is that many nursing home residents are Medicaid payers. To the extent that much of the revenue that a nursing home receives comes from the government and not the individual consumer, income may be a relatively unimportant predictor of profitability. A related explanation is that median household incomes for a county and incomes and wealth levels of the elderly within that county may be only weakly correlated, suggesting that *INCOME* may be serving as a poor proxy for the true variable of interest. In general, although the economic cost coefficients have the correct sign, both variable cost and fixed cost coefficients are imprecisely estimated. The broad pattern of insignificance mirrors the experience of Bresnahan and Reiss (1990), who concluded that market size alone predicts much of the variation in the entry of automobile dealerships across markets and that only a small number of additional cost and demand variables are good predictors.

The two models that predict best, shown in columns v and vi, accurately predict 83.5 percent of all observations and estimate the break-even market size for for-profits at somewhat under 3,100. The coefficient on *OTHERPOP* indicates that, in determining market size, roughly twenty individuals living outside the county seat are equivalent to one individual living inside the town. The results in the following tables are based on variations of model v. (The *GROWTH* variable was dropped because it was insignificant and did not contribute any predictive power.)

Table 6 provides estimates of the model under a variety of assumptions regarding functional form and the distribution of the error term. The first column contains estimates of a probit model under the assumption of homoskedastic errors (i.e., not increasing in market size). The second column reproduces the results from model v in table 5. The third column provides estimates of the alternative probit model given in equation (2). The next two models assume logistic and linear distributions for the error term, respectively, and the final model uses two different samples for estimation and prediction purposes. In general, the models appear to be roughly comparable, but some differences are significant. In particular, although the linear model is the best predictor, it estimates an implausibly low break-even size. In order to facilitate comparisons, marginal effects for *CITYPOP*, *OTHERPOP*, and *OVER65* are presented at the bottom of the table; the effects are generally comparable across specifications. Finally, note the (unsurprisingly) lower prediction rate for the split sample model relative to the other models.

Table 7 examines the correspondence between predicted entry and actual entry across organizational forms. A market was predicted to be profitable if the probability that a for-profit firm would enter it is greater than 0.5. As the first two rows of numbers indicate, whenever entry occurred, the model predicted better for nonprofits (45 out of 53 cases correct, or 84.9 percent) than for for-profits (80.5 percent correct). By contrast, the model predicted only 56.8 percent of government cases correctly. Similar results are obtained when one uses a different profitability threshold. (The threshold of 0.41 is equal to the number of for-profit monopolies divided by the sum of that number and the number of empty markets.) Thus, while there is no "correct" threshold and there are well-known problems with evaluating the fit of a probit model using an arbitrary cutoff level (Amemiya 1981), the predictions presented here do not suggest that the for-profit model performs poorly in predicting nonprofit entry. The lower half of the table, which reports predictions based on split sample estimates, reveals less accurate prediction rates across all ownership types, but nonprofit entry continues to be well predicted relative to for-profit entry.

Table 8 presents the results of the two main comparisons of this study. The first set of three columns report the average estimated probability of entry for nursing homes that entered a market, by ownership type. The second set of columns reports the estimated probability of entering the average market—where the average is taken over all markets actually entered—also by ownership type. Asymptotic *t*-statistics for the difference between estimated for-profit probabilities and estimated nonprofit or government probabilities are provided in the nonprofit and government columns. The results are strikingly consistent across specifications: Without exception, the different specifications fail to identify any significant difference between probabilities of entry for for-profit and nonprofit markets. The probabilities that markets entered by government nursing homes are profitable, however, are consistently lower.

In addition to the question of whether nonprofit nursing facilities enter markets that are unlikely to be profitable is the question of whether nonprofits and for-profits differ significantly in the markets that they do enter. Tables 9 and 10 compare the markets entered by for-profits and other types of nursing homes directly. Table 9 reports results from probit models in which for-profit and nonprofit (or government) markets are compared directly in a binary choice model, where the regressors are a set of market conditions. The dependent variable is equal to one if the monopolist is a for-profit and zero if the monopolist is a nonprofit (or government) nursing home. The for-profit-nonprofit comparison reveals that nonprofits are likely to enter markets with higher incomes and lower wages, suggesting a nonprofit preference for super-profitable markets. However, this is unlikely, since the implied marginal effect of for-profit monopoly relative to nonprofit monopoly is small for each of these variables. Moreover, a test of the joint significance of all coefficients fails to reject the null hypothesis that they are all zero. The for-profit-government comparison suggests that government nursing homes are more likely to enter smaller markets and markets with higher median incomes. (Of borderline significance is the coefficient on *OVER65*, with a p-value of 0.1042.) The null hypothesis that the coefficients are jointly equal to zero is easily rejected. The estimates of the multinomial logit model, presented in table 10, tell a similar story. For this model, the dependent variable is equal to 0 if a market if empty, 1 if for-profit, 2, if nonprofit, and 3 if governmental. Coefficients for the empty markets are normalized to zero and a separate set of coefficients is estimated for all other types of markets. As previously, for-profit markets and nonprofit markets are statistically indistinguishable, while government markets tend to be smaller.

## VI. Discussion

Taken together, the results presented in the previous section suggest that nonprofit nursing facilities are not more likely than for-profit firms to enter markets that are likely to be unprofitable. Nor are they more likely to enter super-profitable markets. Although there is limited evidence in table 9 that incomes are higher on average in markets occupied by nonprofits, and that wages are lower, this result is countered and arguably superseded by the joint insignificance of the regression coefficients.

What can these results tell us about the costs and objectives that underlie the nonprofit firm's entry decision? To begin, if nonprofits have a significant cost advantage, there is little evidence here to support the contention that nonprofits are access-oriented firms on average, since they do not enter unprofitable markets. To the extent that nonprofit entrepreneurs' objectives are increasing in output, quality, or profits, however, and nonprofit supply is scarce, theory implies that low-cost nonprofits should enter super-profitable markets, leaving the remaining profitable markets for the for-profit sector. The results do not indicate that nonprofits enter super-profitable markets, however.[10]

An alternative and perhaps more plausible interpretation of the results is that nonprofits do not ultimately retain a special cost advantage, in which case they would neither occupy the most profitable markets (except by chance) nor enter unprofitable ones. While the tax advantages and access to donor capital and volunteer labor clearly are an advantage for the nonprofit firm, these advantages could be dissipated in a variety of ways. First, nonprofits, lacking access to the equity markets (a consequence of the nondistribution constraint), may face a higher overall cost of capital, the availability of tax-deductible donations notwithstanding. A higher cost of capital could offset the advantage of tax exemptions. This explanation is likely to be more plausible for hospitals, which are relatively capital intensive, than for institutions like nursing homes or day care centers, which are much less so.

Second, management may capture profits through higher salaries or perquisites. This may be especially likely within the nonprofit governance structure since nonprofits lack a residual claimant and may not have a strong board of directors (Glaeser 2002). A related possibility is that the lack of a profit incentive and the inability to tie managerial compensation to a clearly defined objective encourages organizational slack, where resources are used inefficiently (Alchian and Demsetz 1972). In the event of captured profits or inefficient operation, any nonprofit cost advantage may be dissipated. Indeed, since managerial compensation is reported as a cost, the profit capture theory suggests that costs should rise until the reported surplus is zero.[11]

A third possible interpretation of the findings is that they do not actually inform the question of whether nonprofits are willing to enter unprofitable markets, since the theory on which the model is built assumes the existence of "nearly profitable" markets. If the nonprofit's cost advantage is small and existing unprofitable markets are highly unprofitable, then even low-cost nonprofits will not enter the unprofitable markets. As indicated in section III, however, a lack of nearly profitable markets implies a "gap" in the data for one or several market conditions. In general, an examination of the data did not reveal such gaps between for-profit and empty markets, in any dimension. For example, consider the overlap in population and incomes between empty markets and occupied markets indicated by table 3.

While for-profits and nonprofits appear to enter similar markets, government nursing homes do tend to enter markets that are smaller and have a lower percentage of elderly, that is, markets that are less likely to be profitable. This pattern of entry is consistent with the view that government organizations serve as suppliers of last resort (Kapur and Weisbrod 2000), providing output to groups that otherwise would not have access to it.[12] Taken together, the results show that markets entered by nonprofit firms are more similar to those entered by for-profits than those entered by governments.

*Can nonprofit tax exemptions be justified?*

The size of the tax advantages conferred upon nonprofits is substantial. Brody and Cordes (1999) estimate that in 1995 the aggregate value to all secular, exempt institutions (not just nursing homes) of the property tax exemption, income tax exemption, and deductibility of donations was on the order of 37 billion dollars. Given the aggregate cost of these exemptions and the visibility of nonprofit firms in health care, it is natural to ask whether the special treatment that nonprofit health care providers receive can be justified. One potential justification is that nonprofit nursing homes enter markets that for-profits cannot profitably enter, serving populations that would otherwise not have access to long-term care and thereby expanding access to care. The results of this study show that, at least in the case of rural markets, this does not happen. Thus, nonprofit tax exemptions need to be justified on other grounds.

There are two additional possible justifications, which are mentioned only briefly here. The first is that, while nonprofits do not enter unprofitable markets, they may use profits that they earn in profitable markets to cross-subsidize services for the indigent. That is, nonprofits may expand access within markets—even those already occupied by a for-profit—rather than by entering unoccupied markets (Steinberg and Weisbrod 2002, James 1983).[13]

A second possible justification is that nonprofits and for-profits may differentiate their outputs *within* markets. This has been a popular line of inquiry in many mixed industries, including hospitals (Sloan et al. 1998), day care (Mauser 1993), and nursing home care (Weisbrod 1988).[14] In particular, nonprofits may provide levels of nonverifiable quality that for-profits cannot profitably provide. Arrow (1963) and

Hansmann (1980) have argued that the nondistribution constraint reduces the firm's incentive to cut quality in order to increase profits whenever quality is nonverifiable. Consumers may recognize this and therefore trust nonprofits to provide high quality when purchasing such products. With respect to long-term care, this has long been a favored explanation for the presence of nonprofits in the industry. Yet while many have argued that nursing home quality is notoriously difficult for prospective residents to judge (Fraundorf 1977), others maintain that a sufficiently large subset of consumers is informed and thus competition in the industry is sufficiently strong that quality levels that reflect consumer demand (Nyman 1989, Bishop 1988). To the extent that the quality problem is less one of verifiability than it is one of asymmetric information at the time of purchase, the for-profit sector's dominance of the nursing home industry suggests that any information asymmetries are mitigated either by watchdog groups that provide "report cards" on nursing homes or the presence of informed agents—often family members or a long-time physician—acting on behalf of the prospective resident.[15] Unsurprisingly, the empirical evidence on quality differentials across sectors is mixed. This is most likely due to the fact that unobserved or nonverifiable quality will generally be difficult for the researcher to observe and, consequently, measure (Glaeser and Shleifer 2001).

The scope of this study is sufficiently narrow that it is not possible to make broad statements about the desirability of granting tax exemptions to nonprofits. Nonprofit and for-profit firms may differ in many ways that this study does not begin to address, let alone measure. At the same time, if one's goal as a policy maker is to encourage providers of long-term care to enter unprofitable markets, the results presented here suggest that encouraging the nonprofit form of governance—modeled here as a combination of tax exemptions and a nondistribution constraint—is unlikely to be effective in achieving that goal. Policy makers will need to provide other incentives (and consider providing them to both nonprofits and for-profits) to induce entry into unprofitable markets. Tax breaks that are market-specific may be one possibility and have been used to encourage local development more generally.[16] As far as the nonprofit tax exemption is concerned, revoking it for nursing homes would not lead to a net exit of firms: Since for-profits and nonprofits enter comparable markets, the evidence presented here suggests that for-profit entry is likely to follow any nonprofit exit that might occur. There is the possibility that revoking the exemption could have undesirable effects on the nonprofit firm's provision of quality, however. A more complete model on the relationship between tax exemptions and the provision of quality is needed to address this question, and is beyond the scope of this paper.

**VII. Conclusion**

The primary result of this paper, that nonprofit nursing facilities do not generally enter markets that are likely to be unprofitable—indeed, that they appear to enter markets that are very similar to those entered by for-profit firms—is robust to a variety of distributional assumptions and sets of regressors. Likewise, the conclusion that governmental nursing homes *are* more likely to enter small markets holds across specifications.[17] While the evidence presented here cannot conclusively rule out the possibility of a cost advantage for nonprofit firms, the evidence from comparative patterns of entry suggests that such an advantage does not exist. On the contrary, observed entry behavior suggests that in comparisons between for-profit and nonprofit firms, the trivial explanation of the mixed industry—that nonprofits do not enter markets that for-profits do not enter—appears to apply, whereas comparisons between private and governmental firms suggest that the product differentiation explanation of the mixed industry—in which governmental types *do* enter unprofitable markets—is valid.

The consistency of the main results across specifications notwithstanding, a number of caveats apply to the findings presented here. The markets examined in this study were identified in order to facilitate the determination of market boundaries and minimize the likelihood that regulatory barriers would exercise material influence on entry decisions. As a consequence the set of markets chosen is special. Nonprofit firms in urban areas may have different patterns of entry.[18] For example, if prospective nonprofit entrepreneurs tend to live in cities, they may seek to expand access to nursing care for the urban poor more than for the rural poor. Moreover, the consideration of a more diverse set of markets may produce more variation in the independent variables, resulting in more precise estimates.

Caution should also be exercised in extrapolating the results presented here beyond the nursing home industry. Mixed industries differ substantially in the proportions of neoclassical and alternative types that participate, in regulatory environments, in the nature of the output, and in the nature of the clientele. The primary purpose of alternative type entry, as well as the extent to which the conduct of alternative firms approximates profit-maximizing behavior, may vary from industry to industry, even within health care.

Given these caveats, the policy question of whether nonprofit nursing facilities should continue to be exempt from income and property taxes remains open. Even so, the results of this and other studies that find the conduct of exempt and nonexempt firms to be comparable, taken together, suggest that a discussion among policy makers of the value of the tax exemption would be useful. When evaluating the effectiveness of tax exemptions, however, it is important to ask whether there is reason to believe that the conduct of the nonexempt firm would have been different in the absence of entry by an exempt firm, *even when observed exempt and nonexempt conduct is similar* (Hirth 1999). The focus here on monopolies in isolated markets renders this question irrelevant for firm conduct conditional upon entry, as the firms in the sample do not interact. A related question is relevant, however: Would a for-profit nursing facility have served the typical nonprofit monopoly market if the nonprofit firm had not entered? The evidence presented here strongly suggests that the answer is yes.

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**Appendix. Technical Details**

*Lemma.* Suppose that the following conditions are satisfied:

(A0) $\pi_{qy} > 0, \operatorname{sgn}(\pi_{qx_k}) = \operatorname{sgn}(\pi_{x_k}), \operatorname{sgn}(\pi_{yx_k}) = \operatorname{sgn}(\pi_{x_k})$, and similarly for $\pi^A(\cdot)$.

(A1) $v_\pi > 0, v_{qy} > 0$ for all **x**.

(A2) $v(\cdot), \pi(\cdot)$, and $\pi^A(\cdot)$ are continuous, twice differentiable, monotonic in **x**, and strictly concave in *q* and *y*; $v(\cdot)$ is strictly concave in *π*.[19]

Then $\operatorname{sgn}(q^A_{x_k}) = \operatorname{sgn}(y^A_{x_k}) = \operatorname{sgn}(\pi^A_{x_k})$, and $\operatorname{sgn}(q_{x_k}) = \operatorname{sgn}(y_{x_k}) = \operatorname{sgn}(\pi_{x_k})$.

*Proof.* The first order conditions for an interior solution to the alternative type's maximization problem are given by

$$v_q + v_\pi \pi^A_q = 0$$
$$v_y + v_\pi \pi^A_y = 0$$

Differentiating this system with respect to $x_k$ yields

$$\begin{bmatrix} v_{qq} + v_\pi \pi^A_{qq} & v_{qy} + v_\pi \pi^A_{qy} \\ v_{qy} + v_\pi \pi^A_{qy} & v_{yy} + v_\pi \pi^A_{yy} \end{bmatrix} \begin{bmatrix} \partial q^A / \partial x_k \\ \partial y^A / \partial x_k \end{bmatrix} = - \begin{bmatrix} \pi^A_{qx_k} \\ \pi^A_{yx_k} \end{bmatrix}$$

or

$$\begin{bmatrix} \partial q^A / \partial x_k \\ \partial y^A / \partial x_k \end{bmatrix} = \frac{-1}{|H|} \begin{bmatrix} (v_{yy} + v_\pi \pi^A_{yy})\pi^A_{qx_k} - (v_{qy} + v_\pi \pi^A_{qy})\pi^A_{yx_k} \\ (v_{qq} + v_\pi \pi^A_{qq})\pi^A_{qx_k} - (v_{qy} + v_\pi \pi^A_{qy})\pi^A_{yx_k} \end{bmatrix},$$

where $|H|$ is the determinant of the Hessian matrix. Conditions (A0) and (A1) and the concavity of *v* together imply the result. The computation is analogous for for-profit earnings.

*Proposition.* Suppose that, in addition to (A0)-(A2), the following conditions are satisfied:[20]

(A3) $\mathbf{X} = \{\mathbf{x} : x_k \geq 0, k = 1,2,..., K\}$, *K*>2.

(A4) $\mathbf{X}' = \{\mathbf{x} \in \mathbf{X} : \pi^A(\mathbf{x}) \geq 0\} \cap \{\mathbf{x} \in \mathbf{X} : u(\mathbf{x}) > u_0\} \neq \{\}$.

(A5) $\pi^A(\mathbf{x}) > \pi(\mathbf{x}) \, \forall \mathbf{x} \in \mathbf{X}$; there exists an **x** such that $\pi(\mathbf{x}) < 0$.

(A6) $v(q_0, y_0, \pi^A_0) > u_0 \Rightarrow v(q_0, y_1, \pi^A_1) > u_0$ for all positive values of $y_1$ and $\pi^A_1$.

(A7) $\pi(\cdot)$ and $\pi^A(\cdot)$ increase in at least one market condition and decrease in at least one other market condition.

Then for the class of nonprofit objective functions that values quality, output, and profits—i.e., $v_q, v_y$, and $v_\pi$ are all positive—there exists a set of market conditions $\mathbf{x} \in \mathbf{X}$ such that $u(\mathbf{x}) > u_0$ and $\pi^A(\mathbf{x}) > 0 > \pi(\mathbf{x})$.

*Proof.* Since $\mathbf{X}'$ is nonempty, consider any arbitrary vector $\mathbf{x}^0 \in \mathbf{X}'$. If $\pi(\mathbf{x}^0) < 0$, then the conclusion follows. If $\pi(\mathbf{x}^0) \geq 0$, then let $q_0 \equiv q^A(\mathbf{x}^0)$ and $\mathbf{X}'' = \{\mathbf{x} : q(\mathbf{x}) = q_0, \pi(q(\mathbf{x}), y(\mathbf{x}); \mathbf{x}) = 0, \mathbf{x} \in \mathbf{X}\}$. Since the profit function is concave in *q* and *y*, the quality and profit equations that must be satisfied in $\mathbf{X}''$ have a solution; since *K*>2, there is an infinite number of solutions. To show that $\mathbf{X}''$ is nonempty, it remains to show that at least one of these solutions lies within **X**. Consider any arbitrary vector $\mathbf{x}''$ that satisfies the quality and profit conditions. If all components of **x** are nonnegative, then $\mathbf{x}'' \in \mathbf{X}''$, and the set is nonempty. If not, consider one of the negative components, denoted without loss of generality by $x_k''$. Suppose that $\pi_{x_k} > 0$. (The proof for the opposite case is analogous.) By (A7), there exists another component of $\mathbf{x}''$, denoted here as $x_h''$, such that $\pi_{x_h} < 0$. The set of market conditions that yield quality $q_0$ for the profit-maximizing firm are given by $q(\mathbf{x}) \equiv q_0$. Differentiating this expression yields $\partial x_k / \partial x_h = -\dfrac{\partial q / \partial x_h}{\partial q / \partial x_k} > 0$ by the lemma. This implies that we can choose $(\Delta x_k, \Delta x_h)$ such that $x_k + \Delta x_k \geq 0$, $x_h + \Delta x_h \geq 0$ and $q(\mathbf{x}''') = q_0$, where $\mathbf{x}''' = \mathbf{x}'' + \Delta$ and $\Delta$ is a *k*-vector with components equal to $\Delta x_k$ in the *k*th position, $\Delta x_h$ in the *h*th position, and zero elsewhere. This procedure can be repeated as necessary for other negative components of $\mathbf{x}''$. Thus, it is possible to find at least one set of market conditions that is contained in $\mathbf{X}''$.

Choose $\mathbf{x}^1 \in \mathbf{X}''$. By the envelope theorem, $\partial \pi(q(\mathbf{x}), y(\mathbf{x}); \mathbf{x}) / \partial x_k = \pi_{x_k}$, and similarly for $\pi^A(\cdot)$ Without loss of generality and by (A7), profits decline in the first component of **x**. Let $\mathbf{B} = \{\mathbf{x} : \mathbf{x} = \mathbf{x}^1 + (\mu, 0, 0, \ldots, 0), \mathbf{x}^1 \in \mathbf{X}, \mu > 0\}$. Then $\pi(\mathbf{x}^2) < 0$ for all $\mathbf{x}^2 \in \mathbf{B}$. By assumption (A5), $\pi^A(q(\mathbf{x}^1), y(\mathbf{x}^1); \mathbf{x}^1) > 0$. By assumption (A6), $v(q(\mathbf{x}^1), y(\mathbf{x}^1), \pi^A(q(\mathbf{x}^1), y(\mathbf{x}^1); \mathbf{x}^1)) > u_0$. Let $\varepsilon_o = \frac{1}{2}\min\{\pi^A(\mathbf{x}^1), u(\mathbf{x}^1) - u_0\}$. By the continuity of $\pi^A(\cdot)$, there exists a *k*-vector $\boldsymbol{\delta}_0$ and a vector $\mathbf{x}^2 \in \mathbf{B}$ such that $d(\mathbf{x}^1, \mathbf{x}^2) < \boldsymbol{\delta}_0$ implies $u(\mathbf{x}^1) - u(\mathbf{x}^2) < \varepsilon_0$ and $\pi^A(\mathbf{x}^1) - \pi^A(\mathbf{x}^2) < \varepsilon_0$, where *d* is a distance metric. Since $\varepsilon_0 < u(\mathbf{x}^1) - u_0$ and $\varepsilon_0 < \pi^A(\mathbf{x}^1)$, the conclusion follows.

[1] One may also model entry as an endogenous choice process, as Mazzeo (2002) does. Such modeling in the context of the mixed industry is the subject of current research. For a theoretical treatment of endogenous choice in a mixed industry environment, see Bilodeau (2002), as well as the references contained therein.

[2] For expositional purposes, I assume that any type that is indifferent with respect to entry choose not to enter. Alternative types that are private organizations (i.e., not governmental organizations) are subject to the same principles governing the survival of neoclassical firms. The nonnegative profit constraint for the alternative type reflects not the entrepreneur's preferences but the economic reality that no private firm can lose money.

[3] Differences in strategic behavior across types is the subject of separate research (in progress).

[4] For example, the local cost advantage may occur only in a region of **X** in which neoclassical types are also profitable.

[5] See the appendix for details.

[6] Recall that a market's profitability is defined with respect to neoclassical firms.

[7] An alternative definition, used in robustness checks, is that a likely profitable market is a market for which $\Pr\{\pi_i(\mathbf{x}) > 0\} > R$, where $R$ is the number of neoclassical entrants divided by the sum of neoclassical entrants and empty markets.

[8] It may appear that cross-sectional variation in market profitability need not be correlated with firm entry in the case of nursing homes, since Medicaid programs generally seek to reimburse facilities in such a way as to assist with covering fixed costs. In recent years, however, Medicaid reimbursement has not been sufficient to accomplish this (BDO Seidman 2001), requiring cross-subsidization from more profitable private payer residents in order to cover costs. See also, however, Nyman's (1988) analysis of marginal per diem costs in New York. To the extent that private payer revenues are necessary, market profitability will influence the entry decisions of private firms.

[9] One potential problem with this approach is that it assumes that the markets with alternative monopolists are similar to either those with neoclassical monopolists or those with no entrants. A third possibility is that markets with alternative monopolists are intermediate in profitability between the other two types of markets. If there exists a hyperplane separating the market conditions characterizing markets with neoclassical monopolists and those characterizing empty markets, as a consequence of alternative types filling an intermediate position, no solution will exist (Albert and Anderson 1984, Amemiya 1985). An examination of the data implies that such a hyperplane does not exist: Even though entry increases in population, there are many empty markets with larger populations than markets with neoclassical monopolists, and similarly for the other variables.

[10] It is possible that regulatory barriers to entry prevent low-cost entrants from displacing less efficient incumbents, in which case nonprofits with a cost advantage may not be observed entering super-profitable markets. Regression analysis shows that while the presence of entry barriers such as CON or bed moratoria does result in a smaller number of nursing homes per county, on average, these barriers are not significant predictors of whether a market has zero, one, or two nursing homes, suggesting that these barriers have the largest effect in markets that already have a large supply of nursing home beds. Thus, it is conceivable that monopolists could face challenges from entrants, but more research on this particular question is needed.

[11] An additional explanation for the lack of a significant cost advantage is that nursing home profits are generally close to zero in the rural U.S., limiting the effectiveness of income tax exemptions (although cross-sector differentials in property taxes would remain).

[12] Government homes also tend to be located in markets with higher median incomes, but this was not shown to be a significant predictor of profitability.

[13] YMCAs are a good example of organizations with this type of access-oriented objective. They are typically located in cities that also offer more expensive for-profit athletic club facilities. Those with a high willingness to pay make a price-quality tradeoff between the for-profit club and the YMCA. Those with a low willingness to pay consider only the YMCA.

[14] Studies of product differentiation in mixed industries are not limited to comparisons between for-profits and nonprofits. For example, Scott Morton and Podolny (2002) study price and quality differentials across profit-oriented and quality-oriented types in the wine industry.

[15] An additional explanation is that the presence of nonprofits in the industry disciplines for-profit firms, but this is an explanation that works better if information is asymmetric and a subset of buyers are informed (Hirth 1999, Grabowski and Hirth 2002) than if quality is nonverifiable, where neither anticipating the level of quality *ex ante* nor observing it *ex post* solves the problem (Glaeser and Shleifer 2001).

[16] See, for example, Gabe and Kraybill (1998). Policy makers considering this option should be aware, however, of the rather weak relationship between tax incentives and firm conduct that has been documented thus far by such scholars as Wasylenko (1981) and Due (1961).

[17] The finding that for-profit and nonprofit nursing facilities behave similarly to each other (with respect to entry) but differently from governmental organizations has an empirical analogue in Duggan (2000), who finds differences between the behavior of government hospitals and private hospitals—which he attributes to soft budget constraints at the former—but no difference between for-profit and nonprofit hospitals in responsiveness to financial incentives. The location results presented here contrast with those of Norton and Staiger (1994), who find that for-profit hospitals tend to locate in better-insured areas than nonprofit hospitals.

[18] See Yu and Bradford (1995) for a more general comparison of access to long-term care in rural and urban areas.

[19] Assumption (A0) states that if an increase in the value of a market condition enhances profits, then it will also increase the marginal return on both quantity and quality; moreover, it assumes that the return to additional output is larger at higher levels of quality. Assumption (A1) says that the nonprofit entrepreneur values wealth and that additional output is more valuable at higher levels of quality. Assumption (A2) says that the profit functions are well behaved and that positive market conditions (i.e., larger values increase profits) can never be "too good", and similarly for negative market conditions.

[20] Assumption (A3) states that the $k$ market conditions can each be indexed from an arbitrary minimum (here, zero) upward. If some or all of the market conditions are unbounded both above and below, the result holds and the proof is simplified. Assumption (A4) states that at least one nonprofit enters the industry; this occurs by definition in a mixed industry. Assumption (A5) is the assumption of a global cost advantage for nonprofits and the existence of unprofitable markets, while (A6) states that a nonprofit that is content to profitably produce output at one level of quality will also be happy to profitably produce other levels of output at the same quality. Assumption (A7) says that there is at least one positive market condition (e.g., population) and one negative market condition (e.g., labor costs).

**Table 1. Summary of data for retained counties, by number of nursing homes per county**

| Nursing Homes per County | Counties | Total Nursing Homes | Average Population | Average Income |
|---|---|---|---|---|
| **0** | 115 | 0 | 4,037 | $29,120 |
| **1** | 239 | 239 | 6,216 | $29,558 |
| **2** | 78 | 156 | 8,178 | $28,657 |
| **3** | 23 | 69 | 9,530 | $29,739 |
| **4** | 6 | 24 | 8,838 | $31,300 |

**Table 2. Distribution of population and median household income**

| | County Population | | County Income | |
|---|---|---|---|---|
| | **0 NH** | **1 NH** | **0 NH** | **1 NH** |
| **0th percentile** | 67 | 783 | $17,753 | $17,822 |
| **25th percentile** | 1,258 | 3,148 | $23,385 | $25,684 |
| **50th percentile** | 2,407 | 5,307 | $28,783 | $29,283 |
| **75th percentile** | 5,369 | 8,930 | $32,993 | $32,129 |
| **100th percentile** | 14,872 | 14,903 | $56,915 | $53,502 |

**Table 3a. Distribution of population, by organizational form of local monopolist**

| | 0 NH | 1 For-Profit NH | 1 Nonprofit NH | 1 Gov't. NH |
|---|---|---|---|---|
| **0th percentile** | 67 | 1,622 | 1,279 | 783 |
| **25th percentile** | 1,258 | 3,782 | 2,859 | 2,917 |
| **50th percentile** | 2,407 | 7,233 | 5,325 | 4,524 |
| **75th percentile** | 5,369 | 9,898 | 8,534 | 7,421 |
| **100th percentile** | 14,872 | 14,483 | 14,598 | 14,903 |

**Table 3b. Distribution of median household income, by organizational form**

| | 0 NH | 1 For-Profit NH | 1 Nonprofit NH | 1 Gov't. NH |
|---|---|---|---|---|
| **0th percentile** | $17,753 | $17,823 | $19,091 | $18,628 |
| **25th percentile** | $23,385 | $23,563 | $26,284 | $28,175 |
| **50th percentile** | $28,783 | $28,159 | $29,133 | $31,049 |
| **75th percentile** | $32,993 | $30,518 | $31,135 | $34,563 |
| **100th percentile** | $56,915 | $42,476 | $53,502 | $50,166 |

**Table 4. Mean values of variables**

| | All Markets | For-Profit Markets | Nonprofit Markets | Government Markets | Empty Markets |
|---|---|---|---|---|---|
| **CITYPOP** | 2.022 | 2.743 | 2.406 | 2.392 | 1.214 |
| | (1.909) | (2.226) | (1.862) | (1.771) | (1.398) |
| **OTHERPOP** | 3.358 | 4.367 | 3.997 | 2.645 * | 2.592 |
| | (2.835) | (2.882) | (2.525) | (2.247) | (2.592) |
| **GROWTH** | 0.038 | 0.020 | -0.020 | 0.017 | 0.087 |
| | (0.038) | (0.152) | (0.108) | (0.140) | (0.215) |
| **INCOME** | 28.936 | 27.925 | 28.907 | 30.594 * | 29.097 |
| | (6.510) | (5.169) | (4.863) | (6.329) | (7.893) |
| **POVERTY** | 0.170 | 0.178 | 0.162 | 0.151 * | 0.174 |
| | (0.075) | (0.062) | (0.062) | (0.065) | (0.090) |
| **FEMALE** | 0.497 | 0.501 | 0.501 | 0.506 | 0.488 |
| | (0.021) | (0.021) | (0.012) | (0.014) | (0.024) |
| **OVER65** | 0.168 | 0.179 | 0.191 | 0.175 | 0.147 |
| | (0.199) | (0.040) | (0.046) | (0.049) | (0.055) |
| **SINGLE** | 0.268 | 0.275 | 0.281 | 0.268 | 0.257 |
| | (0.040) | (0.035) | (0.033) | (0.036) | (0.045) |
| **WAGE** | 0.414 | 0.411 | 0.393 | 0.413 | 0.427 |
| | (0.102) | (0.062) | (0.056) | (0.081) | (0.139) |
| **LAND** | 0.599 | 0.680 | 0.523 | 0.714 | 0.541 |
| | (0.801) | (0.890) | (0.354) | (1.442) | (0.561) |
| **CON** | 0.324 | 0.390 | 0.264 | 0.378 | 0.288 |
| | (0.469) | (0.491) | (0.445) | (0.492) | (0.455) |
| **MOR** | 0.594 | 0.558 | 0.509 | 0.514 | 0.685 |
| | (0.492) | (0.500) | (0.505) | (0.507) | (0.467) |
| **Observations** | 278 | 77 | 53 | 37 | 111 |

Standard deviations are in small print. In the "Nonprofit Markets" and "Government Markets" columns, means that are significantly different from the corresponding for-profit means at the ten percent level or better are marked with an asterisk. Population and financial variables are denominated in thousands.

**Table 5. Estimates of probit model (heteroskedastic errors)**

| | (i) | (ii) | (iii) | (iv) | (v) | (vi) | (vii) |
|---|---|---|---|---|---|---|---|
| **OTHERPOP** | 0.031 | 0.025 | 0.111 | 0.054 | 0.046 | 0.046 | 0.046 |
| | (0.016) | (0.012) | (0.039) | (0.013) | (0.016) | (0.016) | (0.016) |
| **GROWTH** | | | -0.868 | | | -0.033 | -0.034 |
| | | | (0.339) | | | (0.142) | (0.145) |
| **Variable Profit** | | | | | | | |
| **CONSTANT** | 24.787 | 26.115 | 4.904 | -15.929 | -24.486 | -9.853 | -8.523 |
| | (34.858) | (30.610) | (1.768) | (26.387) | (31.379) | (34.151) | (34.539) |
| **INCOME** | | | | 0.010 | 0.099 | 0.074 | |
| | | | | (0.165) | (0.219) | (0.212) | |
| **POVERTY** | | | | | | | -0.067 |
| | | | | | | | (0.378) |
| **FEMALE** | | | | 3.721 | 15.981 | -7.906 | -6.513 |
| | | | | (50.051) | (62.535) | (65.484) | (65.664) |
| **OVER65** | | | | 104.771 | 113.437 | 114.011 | 111.798 |
| | | | | (44.774) | (59.010) | (61.206) | (60.010) |
| **SINGLE** | | | | 22.420 | 32.768 | 26.604 | 26.949 |
| | | | | (35.237) | (47.102) | (47.714) | (47.803) |
| **WAGE** | | | | 4.574 | -0.022 | -3.726 | -0.017 |
| | | | | (27.098) | (31.977) | (31.563) | (30.838) |
| **Fixed Costs** | | | | | | | |
| **CONSTANT** | 4.947 | 5.842 | 2.299 | 1.238 | 2.021 | 2.140 | 2.113 |
| | (6.322) | (6.814) | (0.577) | (3.214) | (3.912) | (3.789) | (3.787) |
| **WAGE** | | | | 5.083 | 4.340 | 3.988 | 4.082 |
| | | | | (7.978) | (8.646) | (8.496) | (8.561) |
| **LAND** | | | | 0.779 | 1.150 | 1.050 | 1.016 |
| | | | | (0.811) | (1.017) | (1.063) | (1.065) |
| **CON** | | -2.290 | | | -0.969 | -0.925 | -0.899 |
| | | (3.474) | | | (1.456) | (1.479) | (1.475) |
| **MOR** | | -0.887 | | | -0.366 | -0.331 | -0.321 |
| | | (2.305) | | | (1.050) | (1.049) | (1.057) |
| **CON*MOR** | | 2.343 | | | -1.040 | -0.965 | -0.915 |
| | | (4.427) | | | (2.206) | (2.112) | (2.125) |
| $\sigma^2$ | 94.124 | 89.438 | 3.040 | 7.571 | 10.198 | 9.727 | 10.451 |
| | (172.696) | (138.723) | (2.466) | (5.448) | (9.018) | (9.013) | (9.800) |
| **Implied Breakeven** | 1926 | 1770 | 4525 | 3422 | 3075 | 3051 | 3037 |
| | (517) | (417) | (1077) | (645) | (705) | (696) | (698) |
| **Log Likelihood** | -98.787 | -97.409 | -94.167 | -72.424 | -70.323 | -70.410 | -70.526 |
| **Efron's $R^2$** | 0.239 | 0.256 | 0.303 | 0.485 | 0.509 | 0.509 | 0.507 |
| **% Correctly Classified** | 69.7 | 70.2 | 75.0 | 81.9 | 83.5 | 83.5 | 83.5 |

Standard errors are in parentheses. The dependent variable is equal to one if a for-profit occupies the market and zero if the market is empty. Number of for-profit markets = 77. Number of empty markets = 111. The implied breakeven market size is evaluated at mean values of the variables.

**Table 6. Comparison of estimates across distributional assumptions**

| | Probit (i) | Probit (ii) | Probit (iii) | Logit | Linear | Split Sample |
|---|---|---|---|---|---|---|
| **OTHERPOP** | 0.034 | 0.046 | 0.047 | 0.039 | 0.033 | 0.039 |
| | (0.010) | (0.016) | (0.016) | (0.013) | (0.010) | (0.018) |
| Variable Profit | | | | | | |
| **CONSTANT** | -4.432 | -24.486 | -1.856 | -33.658 | -1.548 | 0.791 |
| | (13.627) | (31.379) | (24.814) | (73.510) | (3.253) | (23.574) |
| **INCOME** | 0.079 | 0.099 | -0.038 | 0.214 | 0.021 | 0.101 |
| | (0.078) | (0.219) | (0.149) | (0.504) | (0.019) | (0.133) |
| **FEMALE** | -1.955 | 15.981 | -2.070 | -13.600 | 1.402 | -16.333 |
| | (27.117) | (62.535) | (46.161) | (156.021) | (6.273) | (47.439) |
| **OVER65** | 57.382 | 113.437 | 94.865 | 288.654 | 18.073 | 64.813 |
| | (16.326) | (59.010) | (51.357) | (159.531) | (4.593) | (37.018) |
| **SINGLE** | -6.192 | 32.768 | 3.394 | 72.930 | -1.195 | -4.202 |
| | (15.457) | (47.102) | (32.479) | (114.513) | (3.640) | (30.289) |
| **WAGE** | 2.738 | -2.156 | -2.765 | -7.736 | -0.224 | 2.969 |
| | (10.382) | (31.977) | (25.460) | (76.116) | (2.381) | (22.409) |
| Fixed Costs | | | | | | |
| **CONSTANT** | 0.306 | 2.021 | -1.393 | 4.568 | -0.058 | 0.903 |
| | (1.569) | (3.912) | (2.937) | (8.724) | (0.339) | (2.468) |
| **WAGE** | 3.230 | 4.340 | -4.099 | 9.504 | 0.374 | 3.198 |
| | (3.858) | (8.646) | (7.579) | (18.385) | (0.781) | (6.700) |
| **LAND** | 0.316 | 1.150 | -0.250 | 2.213 | 0.090 | 0.188 |
| | (0.327) | (1.017) | (0.645) | (2.088) | (0.078) | (0.471) |
| **CON** | -0.175 | -0.969 | | -2.621 | -0.101 | -0.342 |
| | (0.505) | (1.456) | | (3.377) | (0.124) | (0.837) |
| **MOR** | 0.250 | -0.366 | | -1.232 | 0.008 | -0.238 |
| | (0.420) | (1.050) | | (2.436) | (0.102) | (0.672) |
| **CON*MOR** | -0.780 | -1.040 | | -2.357 | -0.187 | -0.596 |
| | (0.670) | (2.206) | | (5.081) | (0.164) | (1.072) |
| Probability of Accepted Application | | | | | | |
| **CONSTANT** | | | 1.614 | | | |
| | | | (1.718) | | | |
| **CON or MOR** | | | -0.463 | | | |
| | | | (1.580) | | | |
| $\sigma^2$ | | 10.198 | 3.192 | 17.390 | 1.087 | 0.162 |
| | | (9.018) | (4.749) | (16.692) | (0.801) | (1.294) |
| **Implied Breakeven** | 3237 | 3075 | 2874 | 2752 | 456 | 3328 |
| | (496) | (705) | (605) | (604) | (460) | (893) |
| **Log Likelihood** | -75.243 | -70.323 | -69.867 | -69.760 | -74.515 | -38.957 |
| **Efron's $R^2$** | 0.503 | 0.509 | 0.497 | 0.511 | 0.465 | 0.409 |
| **Marg. Effect of CITYPOP** | 0.227 | 0.208 | 0.250 | 0.220 | 0.179 | 0.198 |
| **Marg. Effect of OTHERPOP** | 0.074 | 0.092 | 0.11284 | 0.082 | 0.057 | 0.118 |
| **Marg. Effect of OVER65** | 10.850 | 3.365 | 3.766 | 3.885 | 4.949 | 8.423 |
| **% Correctly Classified** | 82.4 | 83.5 | 81.9 | 83.5 | 84.0 | 76.3 |

Standard errors (mean squared errors for maximum score estimates) are in parentheses. The dependent variable is equal to one if a for-profit occupies the market and zero if the market is empty. Probit (i) is estimated with a homoskedastic error term. Probit (ii), logit, and linear errors are heteroskedastic in market size. Probit (iii) is the complex probit. Number of for-profit markets=77. Number of empty markets=111. The implied breakeven market size is evaluated at the mean values of the variables. Marginal effects are evaluated at mean values of variables.

**Table 7. Correspondence between predicted and actual market entry**

| Actual Entry? | Predict Entry? | For-Profit | Nonprofit | Governmental |
|---|---|---|---|---|
| <u>**Single Sample**</u> | | | | |
| Yes | Yes (p≥0.50) | 62 | 45 | 21 |
| Yes | No (p<0.50) | 15 | 8 | 16 |
| No | Yes (p≥0.50) | 16 | 16 | 16 |
| No | No (p<0.50) | 95 | 95 | 95 |
| | | | | |
| Yes | Yes (p≥0.41) | 67 | 46 | 22 |
| Yes | No (p<0.41) | 10 | 7 | 15 |
| No | Yes (p≥0.41) | 22 | 22 | 22 |
| No | No (p<0.41) | 89 | 89 | 89 |
| <u>**Split Sample**</u> | | | | |
| Yes | Yes (p≥0.50) | 24 | 35 | 18 |
| Yes | No (p<0.50) | 15 | 18 | 19 |
| No | Yes (p≥0.50) | 5 | 5 | 5 |
| No | No (p<0.50) | 51 | 51 | 51 |
| | | | | |
| Yes | Yes (p≥0.41) | 27 | 39 | 19 |
| Yes | No (p<0.41) | 12 | 14 | 18 |
| No | Yes (p≥0.41) | 6 | 6 | 6 |
| No | No (p<0.41) | 50 | 50 | 50 |

p is the estimated probability of entry, conditional upon market conditions. The 0.41 cutoff was determined by the ratio of for-profit markets to the sum of for-profit and empty markets. All entries are frequencies.

**Table 8. Summary of predicted probabilities by organizational form**

| | Mean Probability of Entry | | | Probability of Entry for Mean Market | | |
|---|---|---|---|---|---|---|
| | For-Profit | Nonprofit | Government | For-Profit | Nonprofit | Government |
| **Probit (i)** | 0.678 | 0.668<br>(0.437) | 0.482<br>(3.630) | 0.845 | 0.832<br>(0.588) | 0.629<br>(4.003) |
| **Probit (ii)** | 0.689 | 0.702<br>(-0.755) | 0.508<br>(2.985) | 0.834 | 0.866<br>(-1.721) | 0.706<br>(2.119) |
| **Probit (iii)** | 0.693 | 0.702<br>(-0.416) | 0.477<br>(2.664) | 0.855 | 0.869<br>(-0.556) | 0.728<br>(1.607) |
| **Logit** | 0.700 | 0.710<br>(-0.648) | 0.523<br>(3.353) | 0.839 | 0.871<br>(-2.020) | 0.737<br>(1.942) |
| **Linear** | 0.684 | 0.699<br>(-0.715) | 0.532<br>(4.643) | 0.837 | 0.825<br>(0.637) | 0.662<br>(5.324) |
| **Split Sample** | 0.766 | 0.723<br>(0.943) | 0.488<br>(1.706) | 0.932 | 0.920<br>(0.259) | 0.670<br>(1.609) |

t-statistics for the difference between for-profit and nonprofit/government estimates are in parentheses.

**Table 9. Comparison of markets entered by for-profits and other types**

| | Nonprofit | Government |
|---|---|---|
| **CONSTANT** | 2.115 | 4.652 |
| | (4.355) | (5.851) |
| **CITYPOP** | 0.037 | 0.144 |
| | (0.072) | (0.081) |
| **OTHERPOP** | -0.077 | 0.235 |
| | (0.063) | (0.072) |
| **INCOME** | -0.069 | -0.072 |
| | (0.030) | (0.036) |
| **FEMALE** | -2.681 | -13.229 |
| | (7.636) | (10.216) |
| **OVER65** | -1.902 | 10.005 |
| | (4.753) | (6.158) |
| **SINGLE** | -1.002 | 2.490 |
| | (5.094) | (6.370) |
| **WAGE** | 4.555 | 2.898 |
| | (2.755) | (3.140) |
| **LAND** | 0.352 | -0.132 |
| | (0.280) | (0.156) |
| **CON** | 0.501 | -0.322 |
| | (0.290) | (0.331) |
| **MOR** | 0.158 | -0.174 |
| | (0.261) | (0.351) |
| **Log Likelihood** | -81.323 | -57.799 |

Standard errors are in parentheses. The dependent variable is equal to one if the market is occupied by a for-profit and zero if the market is occupied by a nonprofit (column 1) or governmental nursing home (column2). There are 77 for-profit, 53 nonprofit, and 37 government markets in the sample.

**Table 10. Multinomial logit estimates**

| | For-Profit | Nonprofit | Government |
|---|---|---|---|
| **CONSTANT** | -16.421 | -20.169 | -37.465 |
| | (6.568) | (7.543) | (9.529) |
| **CITYPOP** | 0.890 | 0.835 | 0.620 |
| | (0.156) | (0.165) | (0.171) |
| **OTHERPOP** | 0.353 | 0.458 | 0.027 |
| | (0.079) | (0.093) | (0.102) |
| **INCOME** | 0.008 | 0.116 | 0.135 |
| | (0.042) | (0.050) | (0.050) |
| **FEMALE** | 17.127 | 21.184 | 63.898 |
| | (12.525) | (14.104) | (18.711) |
| **OVER65** | 26.618 | 30.187 | 14.134 |
| | (6.912) | (7.679) | (8.536) |
| **SINGLE** | 3.634 | 5.564 | -4.258 |
| | (6.903) | (7.749) | (8.269) |
| **WAGE** | -2.488 | -8.362 | -5.008 |
| | (3.287) | (4.200) | (3.436) |
| **LAND** | -0.136 | -0.806 | 0.036 |
| | (0.282) | (0.494) | (0.242) |
| **CON** | 0.554 | -0.278 | 0.743 |
| | (0.482) | (0.545) | (0.591) |
| **MOR** | -0.152 | -0.521 | -0.036 |
| | (0.443) | (0.486) | (0.568) |
| **Wald Statistic** | | 14.078 | 30.029 |
| **Log Likelihood** | -270.833 | | |

Standard errors are in parentheses. The dependent variable is equal to 0 if the market is empty (111 cases), 1 if the market is occupied by a for-profit (77 cases), 2 if the market is occupied by a nonprofit (53 cases), and 3 if the market is occupied by a governmental nursing home (37 cases). The Wald statistics are distributed according to the chi-squared distribution with 11 degrees of freedom. They test the equality of all for-profit coefficients with all nonprofit and governmental coefficients, respectively. The critical value for rejection of the null hypothesis at the ten percent level is 17.28.