Does Organization Ownership Matter?
Structure and Performance in For-Profit, Nonprofit and Local
Government Nursing Homes

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Abstract

We compare the structure and performance of for-profit (FP), nonprofit (NP) and local government (LG) organizations. These organizations differ in their ownership structure, objectives and agency relations. We conjecture that, compared to NP and LG, FP firms (a) delegate less decision-making power to employees, (b) provide more incentives and fewer fringe benefits, (c) monitor less, and (d) rely less on social networks to recruit employees. We also hypothesize that, relative to NP and LG, FP firms (i) are more efficient, (ii) provide similar levels of service elements that observable to their customers, (iii) provide lower levels of less-well observable elements, and (iv) provide less of the relational elements. Differences in structure and performance are likely to be tempered by regulation, market competition and institutional pressures for similarity. We study detailed performance outcomes for all the 369 Minnesota nursing homes included in federal and state datasets, and organization structure for a subsample of 105 homes that responded to our survey. Our empirical investigation generally supports our hypotheses. In particular, we find that FP homes serve more residents than NP and LG, after controlling for quality differences. However, FP homes provide lower quality services on a large array of attributes, especially those that are less observable by nursing home residents and their families. The differences among different types of organization are small, but significant.

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I. Introduction

Does it make a difference whether children go to a for-profit, nonprofit or government child care center, elementary school or college? Would you prefer to place an elderly relative – or end up yourself – in a for-profit, nonprofit or local government nursing home? Are there significant differences among for-profit, nonprofit and government organizations in the way in which they are structured, what they produce, and how they produce it? Does organization ownership matter?

Differences in ownership may affect organizational objectives, organizational efficiency, and other factors, and the size of their impact depends on the nature of the products, market competition and more. A key difference among for-profit, nonprofit and local government organizations concerns the identity of those who possess ultimate control over them: owners, boards of trustees, and politicians, respectively. The locus of control affects organizational objectives, with owners of for-profit firms designating pursuit of profits as their organizations' objective. Trustees and directors of nonprofit organizations are expected to advance some product-related goals such as quality or access. Those in charge of government organizations may seek also product-related goals, perhaps additional social goals (such as those related to provision of employment to certain groups) or, usually illicitly, advancement of their political aspirations.

The wealth of owners is tied to the success of the for-profit firms in which they have ownership stakes, whereas the individuals who control nonprofit and government organizations have no legal ownership stakes. Simple agency considerations suggest therefore that principals of for-profit firms will be more effective in driving efficiency than their counterparts in nonprofit and government organizations. However, nonprofit and government organizations may draw leaders, workers and managers who believe in providing products that reflect some public needs, and may be motivated to work effectively towards such goals beyond what is dictated by their narrow financial interests. Moreover, those who design the structure of such organizations may be aware of their specific advantages and disadvantages and may choose the design that is most conducive to the attainment of their goals. Organizations pursue their objectives not only through internal design but also by responding to opportunities such as market power, the nature of their product and asymmetric information. The extent and fashion in which an organization will exploit its power or informational advantage about the characteristics of a product at the expense of consumers depends on its objectives. Thus the way an organization is designed and how it performs on various dimensions is likely to depend on who owns and controls it through (a) the goals that are set for the organization, (b) the agency problems the organization faces, (c) who is attracted to work in the organization, and (d) the opportunities the organization enjoys for advancing its goals.

The empirical literature dealing with the issues raised above typically involves two-way comparisons, for-profit firms versus state-owned firms, and for-profit firms versus nonprofit organizations. Most studies address questions of performance; the few studies that consider organization structure look at isolated elements, mostly at wages and incentives. The literature that deals with differences in performance between state-owned enterprises and privately-owned firms, frequently in the context of transition economies, seeks to tease out the performance effects of different forms of privatization, varieties of private owners, diverse market structures, and institutional environments (e.g., Megginson and Netter, 2001 and Brown, Earle and Telegedy, 2006). Broadly, these studies find that replacing state ownership from large swaths of the economy has a favorable effect on labor productivity and related measures of economic performance, as one would expect from the agency-theoretic perspective that predicts that letting private owners run firms instead of state-appointed 'red' managers should generate some efficiency gains.

The literature that compares for-profit firms, nonprofit organizations and government organizations focuses on services in developed market economies, the industries where these organizations coexist. Services have multiple dimensions and the outcomes of their delivery depend not only on the producer but also on the consumer. Whereas a good such as a car has attributes determined by the production process that can be measured independently of the characteristics of its purchasers, the outcomes of a service such as medical treatment depend not only on the skills of the medical team and the attributes of the hospital where the team practices but also on the characteristics of the patient during and after treatment. These features complicate the evaluation of performance and bring into the fore the potentially important role of the interplay among the four factors that may vary across different types of organization: goals, agency problems, worker self-selection, and the willingness to exploit opportunities. So it is not surprising that the literature on the comparative performance of for-profit, nonprofit and government in general and in the most studied industry, hospitals, reveals uneven patterns. The results of empirical research on performance (there is very little on organization structure) are contingent on numerous industry-specific details; moreover, it is hard to make sense of the disparate findings outside the context of a theoretical framework. We review one segment of this literature (on nursing homes) later in this section.[1]

The present paper takes up the question in the title in the context of nursing homes and examines it empirically using a uniquely rich dataset from Minnesota. Nursing homes provide a complex and multi-dimensional product, care for physically frail and cognitively impaired individuals. The nature of nursing home care gives rise to substantial asymmetric information between providers and residents, residents' families, insurance companies, guardians and other parties with interest in the well-being of residents. This feature and

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[1] There is a substantial body of management literature that compares structure and performance in private and public organizations. Although written from a different scholarly perspective with somewhat different concerns, the findings are generally similar to those in the economics literature; see Boyne (2002).

the fact that the majority of people end up spending time in a nursing home have generated substantial scholarly and journalistic interest in the industry as well as regulatory oversight.[2] The industry is regulated and overseen by various government agencies, generating a wealth of data that are not available for other industries with the exception of hospitals. Unlike hospitals, nursing homes are small (the average home has fewer than 100 residents) and relatively simple organizations that provide a single product, nursing care but not medical treatment, relying on a staff that includes a limited range of occupations.[3] The nursing home industry is populated by for-profit, nonprofit and local government (heretofore FP, NP and LG, respectively) organizations, making it eminently suitable for investigation of the differences in structure and performance among different types of organization.[4]

Although nursing homes have distinct features that differentiate them from many other industries, our analysis is relevant for the understanding of differences among the three types of organization in general. We regard this investigation as a contribution to the understanding of differences among organizations that can be extracted only by a careful examination of industry-specific attributes, which must be studied carefully and in detail. For example, it would be nearly impossible to specify multiple variables that capture different degrees of asymmetric information between sellers and buyers in a believable and convincing manner across multiple industries in order to test predictions relevant to the concept of asymmetric information (not to mention the impracticality of collecting data to support such variables). Such specification is highly industry-specific and requires deeper investigation than that afforded in a cross-industry inquiry.

The empirical literature on different types of organization in the nursing home industry

The comparative literature on nursing homes, like that on other industries, has focused much on performance and little on organization structure. An excellent survey of the literature (through the end of 2002) is presented by Schlesinger and Gray (2006), who compare NP and FP nursing homes in terms of various dimensions of performance, including economic efficiency, quality of care, and accessibility for unprofitable patients. The authors summarize their findings in a table, which is reproduced below without the references. Their principal conclusions are that (1) FP nursing homes have an advantage over NP homes in terms of various

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[2] In 1980, the book *Unloving Care: The Nursing Home Tragedy* by Bruce Vladeck uncovered a range of troublesome abuses. Since then, the regulatory framework was strengthened, partly in response to the book's revelations, but later research and personal witnesses reveal that problems remain; see, for example, GAO (2007), a book by a nursing home aide (Gass, 2004) relating his own experience, and a book by a renowned scholar of long-term care and his sister recounting the nursing home experience of their mother (Kane and West, 2005).

[3] To ensure greater homogeneity of the type of service we study, we exclude from our sample the few nursing homes that provide specialty care (such as to mentally-ill patients). To ensure greater clarity in the types of organization examined here, we exclude the handful of nursing homes that are owned by state government (predominantly caring for military veterans in conjunction with the federal Veterans Affairs Administration), with the obvious cost of being unable to say anything about state-government owned nursing homes.

[4] The reasons for coexistence of the three types of organization in this industry are varied, but ultimately are likely to be linked to asymmetric information problems; see Hansmann (1996) for a theoretically-driven historical discussion.

measures of economic efficiency, and (2) service quality is significantly higher in NPs (controlling for various home and resident characteristics).

Schlesinger and Gray (2006) also review studies that focus specifically on dimensions of quality that are relatively easy to monitor or assess and dimensions that are relatively difficult to monitor because customers suffer from asymmetric information relative to producers, dimensions which Weisbrod and Schlesinger (1986) term Type I and Type II dimensions, respectively. They found that "the empirical research that directly measures quality is biased toward measuring Type I aspect, since they are by definition those that are more readily measured" (p. 389). To the consumers of nursing home services the more accessible measures involve regulatory violations, because the information has been publicly available through government regulatory bodies and since the early 2000s it has been disclosed online; two studies showed little difference between NP and FP homes. Other measures were favorable to NP homes. Compared to FP homes, NP homes were found to be associated with lower resident mortality and lower incidence of adverse outcomes such as infections, decubitus ulcers, dehydration, physical restraints and accidents rates; these are relatively observable, Type I, outcomes. Schlesinger and Gray (2006) focus on several direct and indirect indicators of Type II outcomes, including consumers' choice between FP and NP homes (less-informed consumers should seek out nonprofit providers), home residents' experience and reports of care problems, complaints and malpractice claims filed by residents, adoption of new care technologies, and more; NP homes have better outcomes in all these outcomes.

Schlesinger and Gray's 2006 Summary of Empirical Findings Comparing Performance of Nursing Homes of Different Types of Ownership*

Direction of findings	Specific measures (number of studies using this measure)		
	Economic performance	*Quality of care*	*Accessibility for unprofitable patients*
NP advantage	Administrative overhead (1) Revenues per admission (4)	Malpractice suits (1) Satisfaction with treatment (2) Process measures of quality (6) Regulatory violations (5) Adverse outcomes (8) Physical restraints (3)	Services at reduced charge (1)
No difference	Administrative overhead (3) Measures of inefficiency (1)	Regulatory violations (2) Functional improvements (3) Process measures (2)	Medicaid admissions (1)
FP advantage	Average operating cost (7) Measures of inefficiency (7) Average total cost (5)	Adverse outcomes (1) Antipsychotic use (1)	Medicaid admissions (4)

*Adapted from Schlesinger and Grady (2006, p. 385), who provide complete references and detailed discussion.

More recent studies, using new measures of performance or revisiting old ones, generate results that are consistent with the studies summarized by Schlesinger and Gray (2006). Knox, Blankmeyer and Stutzman

(2003) find that, controlling for quality differences, FP nursing homes in Texas are overwhelmingly more cost efficient than NP homes. In a national dataset, Stevenson (2006) finds that the incidence of consumer complaints in FP nursing homes is twice as high as that in NP homes. Ballou (2005) examines choices made by Wisconsin consumers who pay their own nursing home expenses and finds that they favor NP homes over FP and LG homes. Hirth, Banaszak-Holl, Fries and Turenne (2003) find that (1) that residents are more likely to transfer out of low quality than out of high quality homes, and that (2) FP residents are more likely than NP residents to transfer to other nursing homes. Grabowski and Castle (2004) find that a higher NP market share is associated with higher quality in both FP and NP homes. O'Neill, Harrington, Kitchener and Saliba (2003) find that a profit level above a certain threshold is associated with a significantly higher number of regulatory deficiencies in FP homes, but not in NP homes. A literature review by Hillmer, Wodchis, Gill, Anderson and Rochon (2005), focusing on ownership-related quality differences, like Schlesinger and Gray (2006), found systematic quality differences favoring NP homes.

In sum, the literature provides a fairly consistent picture whereby FP nursing homes are run at a lower cost and possibly more efficiently than NP homes, but NP homes provide higher quality services than FP homes. The link between the two findings, to the extent that it is explained, is attributed to the tradeoff between financial and non-financial goals and the difference in goals between FP and LG homes. There is too little research comparing LG homes with the other two types to draw any conclusions. Finally, there is no evidence on comparative organization structure of nursing homes of different ownership types.

Our study contributes to the comparative literature on nursing homes in several ways. First, we develop a theoretical framework that focuses on organizational goals, agency problems, worker self-selection, and an organization's willingness to exploit opportunities to enhance its goals. We generate predictions about ownership-related differences in (a) organization structure in terms of delegation of decision-making, incentives, recruiting and monitoring, and (b) performance in terms of efficiency and provision of observable (Type I) and unobservable (Type II) dimensions of nursing home care. Second, we use a unique dataset to explore empirically these theoretical predictions about both structure and performance. Our variables concern multiple elements of organization structure, and multiple outcome variables reflect a broad spectrum of observability of quality dimensions as well as productive efficiency. We can therefore examine more closely organization structure and the relationship between efficiency and quality choices on the basis of variables reflecting the same organizations and the same decision-making processes than was possible in the extant literature. Finally, in addition to FP and NP homes, the focus of much of the extant literature, we study also LG homes. Thus this study presents both a comprehensive theoretical framework and a comprehensive test of predictions stemming from it.

We investigate performance of all nursing homes in Minnesota that appear in relevant state and federal datasets (369 homes), and organization structure among homes that responded to our survey (121 homes, of which 105 have usable detailed data). The single-industry and single-state focus confers the advantages of minimization of unobserved heterogeneity in industry characteristics, regulation, cultural practices, social norms, and more, and the assemblage of a uniquely-detailed dataset. In particular, the regulatory framework and enforcement, which vary widely across states and even within states, are uniform in the state of Minnesota. Furthermore, nursing homes in Minnesota are price-controlled (relative to residents' need for care and geographic location), and access to nursing home care is assured regardless of the ability to pay. In addition to being actively regulated on many dimensions of quality to comply with federal regulations, the availability of data on Minnesota nursing homes is better than almost anywhere else thanks to the state's recent initiative to augment the collection of data already mandated by the federal government with data on quality and resident satisfaction. Focusing an empirical analysis on structure and performance of different types of organization in this environment is likely to result in findings that are less influenced by unobserved heterogeneity and omitted variables and therefore allow better inference about the effects of organization type, than analyses based on other datasets on nursing homes or other industries. Because nursing homes are relatively small organizations, the information reflects the circumstances of homogeneous organizations, in contrast with the diverse circumstances of larger organizations where practices may differ considerably across sites and departments.

Given the regulatory framework to which nursing homes are subjected, and strong professional standards that guide the work of nurses, one would expect few, if any, differences among the three types of organization. Nevertheless, our empirical findings suggest that there are statistically significant differences in structure and performance among the three types of organization in ways predicted by economic theory. The rest of the paper is organized as follows. In Section II of the paper we develop a conceptual framework for the analysis of the relationship between organization type, structure and performance. In Section III we introduce the nursing home industry, the datasets, and variables used in the empirical estimations. In Section IV we describe our empirical investigation. Section V concludes the paper.

II. A Theoretical Framework for the Investigation of Organizational Type, Structure and Performance

This section focuses on a comparison of models or 'ideal' types of FP, NP, and LG organizations. We recognize of course the great diversity within each type associated with size, dispersion of principals, and much more. We control for some of these factors in the empirical work but do not discuss them in this section. Furthermore, for similar reasons of the need for focus and relative brevity we defer most discussion of differences between NP and LG organizations until the empirical section.

(a) Performance in different types of organization

In a narrow sense, organizational performance reflects organizational (principals') objectives, such as profitability. However, in order to compare the performance of organizations of different types a broader conceptualization is necessary. More broadly, organizational performance also includes the organization's effects on social welfare through its impact on the well-being of various stakeholders that interact with it.

Conceptually, organizational objectives can be deduced from the identity of the principals who control an organization. In the case of FP firms, the principals are equity owners; in general, they seek the best returns on their investments, suggesting the goal of profit maximization. In NP organizations, the principals may be individuals or organizations who feel that FP provision is unsatisfactory and prefer to run an organization that pursues the goal of consumer well-being. The principals may be consumers or others who care about them, such as cultural associations, religious groups and foundations.[5] In some jurisdictions, particularly in smaller and relatively homogeneous locales, government may undertake provision on behalf of some groups of current and potential consumers and possibly broader goals compatible with government actions.[6]

Will different types of organization pursue their respective goals with equal effectiveness? The diffuse or nonexistent ownership rights in NP organizations and to a greater extent in LG organizations (although to a lesser degree than in higher-level government) has long been a source of suspected lower efficiency as compared to FP firms. The argument has been formulated in diverse ways but it essentially states that without financially-motivated owners, NP and LG organizations will suffer from the problem that ultimately less effort than in FP firms will be exercised in "monitoring the monitors," enforcing good management and making sure that employees at all levels of the organization perform optimally.[7]

Fama and Jensen (1983a, 1983b) also noted the problem in their analysis of agency problems, but concluded that appropriate organization design can handle the problems. In particular, boards of directors should be able to exercise sufficient control to eliminate the efficiency differences between NP and FP organizations (we discuss organization design in more detail below). Of course, the problem of efficiency associated with insufficient motivation by principals who have no ownership claims can be compensated by

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[5] For example, in Rochdale, England local stores were suspected of selling adulterated foodstuff (milk diluted with water, flour mixed with aluminum to whiten it or potatoes mixed with limestone to bulk it up), exploiting the fact that it was not easily discernable from unadulterated foodstuff; this being in the first half of the nineteenth century, government was not effective at regulating provision of foodstuff and at reducing asymmetric information between sellers and buyers. After a few unsuccessful attempts (due to insufficient capital, free ridership and other organizational problems), the Rochdale Society of Equitable Pioneers was founded by local residents in 1844 essentially as a NP organization aimed at providing unadulterated foodstuff at the lowest possible prices. The Rochdale Society's principles have become the principles underlying the operation of consumer cooperatives worldwide (Enke, 1945).

[6] Some groups may seek to correct problems with access to public goods associated with the possibility of excludability, by providing a service such as library or a park at a low or no cost; religious groups may emphasize the provision of local public goods to their co-religionists by supplying a suitable religious environment; and LG organizations will, often by law, provide services with universal access and will have additional objectives associated with different citizen and lobby groups.

[7] For example, Clarkson (1972) made this sort of argument in the context of hospitals, using the perspective of the 'property rights' school.

other type of motivation, particularly that which stems from support for the organization's goals. Principals (members of board of directors in particular) who are motivated by their belief in the mission of their organization may possibly act as effectively as profit-motivated owners. Furthermore, managers and employees in NP and LG may share the values or goals of the NP and LG in which they work, thus avoiding the problem of compliance with organizational goals in the first place.[8]

A further and significant complication arises from the fact that the objectives of NP and LG organizations are more complex and more difficult to formulate and to articulate than the single and quantitatively simple measure of profit. This makes it more difficult to hold managers and employees responsible for performance that cannot be clearly contrasted with objectives. This perspective suggests that NP and LG organizations are likely to be less-well managed than FP firms.

In sum, NP and LG face more severe agency problems than FP, starting with managers who may invest less effort in planning, the design of strategy, ensuring that workers do their best to advance organizational objectives, and other managerial duties. Whether corrective organization design and improved motivation associated with support for organizational goals by board members, managers and employees are sufficient to raise the efficiency of NP and LG organizations to that of FP firms, or even exceed it, is an empirical question.

An organization's output may be characterized in terms of quantity (such as the number of residents served by a nursing home) and quality (attributes such durability, reliability, and effectiveness in accomplishing its stated purposes). Some of the quality attributes are subject to asymmetric information between seller and buyer and, as the large literature has shown, present special opportunities for the pursuit of sellers' profits, and potentially other objectives (see Akerlof, 1970, for the classic discussion of this issue). Asymmetric information is an important factor in situations where the quality attributes are not immediately apparent, and where the materialization of these attributes depends partly on consumer behavior and characteristics, e.g., the health of residents in nursing homes and child development outcomes in day care centers. Asymmetric information is especially prominent in situations where some consumption decisions are made by persons other than the direct consumers, such as parents of children in day care and family members and insurers in the case of many nursing home residents. Quality attributes may thus be classified relative to the degree of asymmetric information between sellers and consumers, ranging from observable to unobservable attributes (Type I and Type II attributes in Weisbrod and Schlesinger's, 1986, classification). For example, the relatively observable attributes in a nursing home concern the size of residents' rooms, the quality of food, the appearance of facilities and the ratio of nursing staff to residents, which can be evaluated by a relative visiting on a weekend. In contrast, partially-incapacitated residents have limited ability to judge the details of the services they receive separately from the effects of their own condition and may be unable to communicate their needs and their perception of

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[8] See Preston (1989), Leete (2006) and Roomkin and Weisbrod (1999) for NP and Boyne (2002) for government.

the quality of services they receive to members of their family; these details are not discernible by a visiting relative.

Competition should drive organizations of different type to provide similar levels of the observable attributes, with consumers gravitating to higher-quality providers. However, competition does not work for unobservable attributes. One may imagine that unobservable attributes may, over long periods of time, become partially known through accumulated and combined observations of many consumers and family members, which may be stored in an organization's reputation in the community. The effectiveness of this mechanism is limited by the fact that most people have only one nursing home experience, each experience is unique, and most experiences are, by the very circumstances of how people end up in nursing homes, preordained to have an undesirable ending. With this sort of data it is hard to make sense of small differences across organizations. Information made available by regulators and other parties may further reduce the long-term asymmetric information between sellers and consumers.

Providers of a service may be able to provide little of the unobservable elements even if they are desired by consumers because they cannot observe actual delivery.[9] FP firms have a financial motive to undersupply these elements because their production is costly. NP and LG organizations' commonly stated objectives can rarely induce them to seek to take advantage of consumers' informational disadvantage (some seek to remedy market failure associated with asymmetric information). Indeed, a central theory of NP organizations considers their emergence as a response to the market failure caused by asymmetric information by providing trustworthy services to customers (Arrow, 1963; Hansmann, 1980; Hirth, 1999).

However, if NP and LG organizations' objective is to provide their product to the largest possible number of consumers who may otherwise not have access to the product, then they may undersupply unobservable attributes in order to shift resources to provide a larger quantity.[10] Undersupply may also arise if, in the shadow of severe agency problems, employees may shirk their responsibilities in areas in which negative effects are hard to observe, or managers may divert resources to show visible results that are valued by donors or higher levels of LG.[11] Although the possibility of undersupply of unobservable attributes by NP and LG organizations exists and therefore the difference between them and FP firms cannot be theoretically signed, we expect that *bona fide* NP and LG organizations will provide higher levels of unobservable attributes, especially if self-selection by employees eliminates gross undersupply of such attributes by shirking employees.

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[9] How little they can provide depends on how the unobservable elements are co-produced with observable elements, whether the degree of unobservability varies across consumers, and, of course, the willingness of employees to cooperate in the undersupply of these elements.

[10] This objective does not fit the nursing home industry, particularly in Minnesota, because poor individuals' care is largely covered by the government.

[11] The asymmetric information problem that affects adversely consumers may be present in the principal-agent relationship, too, allowing managers and workers to do things that principals would not approve of; however, this is *not* an element that differentiates across types of organization.

Personal services and health care contain a *relational* or *affective* attribute associated with the human interaction between providers and consumers, and among consumers. The quality of the relationship between providers and their charges depends on the concern and empathy exhibited by providers. In NP, these are likely to be organizational goals that affect hiring of employees and their task assignments, more than in FP firms (Gui, 2005). This attribute is unobservable by those who are not direct consumers because it has no physical correlates and when direct consumers (such as many nursing home residents) are not able to articulate their emotional experiences. The relational attribute is likely to be provided better by NP and LG organizations that are concerned with consumers' well-being than by FP firms that may divert resources from it to observable attributes.

In sum, we hypothesize that, as compared to FP firms, NP and especially LG organizations will exhibit lower productive efficiency, and will provide a higher level of relational elements as well as higher quality, especially for less observable attributes.

(b) Organization type and organization structure

Organizations adopt various measures to direct employees' efforts towards organizational objectives. These measures are captured by organization structure (design), including the allocation of decision-making, pay and incentives, monitoring, evaluation, selection of new workers, and more. There are many factors that affect the choice of organization structure (Ben-Ner, Montias and Neuberger, 1993); here we are concerned with differences associated with the type of organization, keeping constant the nature of the product. These differences depend on the relative costs and benefits of deploying the various practices in the three types of organization.

The key choice concerns the allocation of decision-making, with other elements of organization structure supporting the effectiveness of a particular allocation (Prendergast, 2002; Ben-Ner, Kong and Lluis, 2007). NP and LG organizations are more likely than FP firms to delegate decisions to workers for three reasons. First, delegation, especially to key workers, may be a consequence of the decision-making vacuum created by less involved principals due to the agency problems discussed earlier (Pauly and Redisch, 1973; Glaeser, 2003). Second, NP and LG workers will be granted greater autonomy as to how, when to deliver relations elements (the delivery of tender, loving care cannot be directed from above). Third, if there is indeed self selection by workers attracted by NP and LG objectives, they will be trusted more than their FP counterparts and therefore they will be permitted a greater degree of decision-making autonomy.

Delegated decision-making authority must be supported by appropriate motivation to ensure that it is exercised in support of the organization's objectives. Some of the motivation may come from employees' intrinsic motivation to do the right job in their occupations and their organizations. It has been argued that NP

and LG workers' values are better aligned with those of the organizations in which they work than is the case for FP workers (Francois, 2000; DeVaro and Brookshire, 2007). If this is indeed so, NP and LG organizations will have to invest less in practices that support appropriate decisions than FP firms, but it is extremely unlikely to eliminate the agency problem or even compensate for the agency problems associated with the lack of ownership rights in NP and LG organizations. Ultimately, the question of the net effects of value congruence and ownership rights on organization structure is an empirical question.

Appropriate motivation may also be generated through incentives that tie rewards to actions. In FP firms, executives, managers and lower-level employees can be compensated relative to firm objectives through various incentives linked to profits. Top executives may share in profits or own stock, and in turn they may proffer lower-level employees incentives that promote profit-enhancing behavior. In contrast, NP and LG organizations have broad and often complex objectives concerning various facets of the product and, akin to the problem of incentives in multi-tasking situations (Holmstrom and Milgrom, 1991), cannot offer their executives simple incentive schemes to pursue these objectives (Roomkin and Weisbrod, 1999),[12] which, in turn, lowers executives' motivation to manage as well as their ability to proffer lower-level employees incentives that induce effectively desirable behavior in a multi-objective environment. Consequently, FP firms will tend to rely more on variable financial incentives than their NP and LG counterparts.

Monitoring may substitute for incentives (Prendergast, 2002). Relying less on incentives linked to performance may propel NP and LG organizations to monitor more aspects of worker behavior, as compared to FP firms. However, unlike provision of incentives, monitoring requires more effort on the part of supervisors and higher-level managers, which may not be forthcoming at the optimal level. NP and LG organizations have another organizational tool at their disposal to compensate for their limitations in the provision of variable financial incentives and monitoring. They may offer efficiency wages – pay above the market rate – which can be implemented through higher pay rates or better fringe benefits. Efficiency wages may (a) induce employees to work harder for the fear of being caught shirking through monitoring (Shapiro and Stiglitz, 1984), (b) motivate them to return the gift of above-market wage by working harder (Akerlof, 1980), or (c) attract better workers (Weiss, 1991). In order to support the effectiveness of efficiency wages, NP and LG may (a) invest more in monitoring compliance, if supervisors can evaluate the work that employees carry out, as in the case of nurses where supervisors work side-by-side with their subordinates, (b) select employees who are likely to be more responsive to the gift-giving and reciprocity aspects of efficiency wages, that is, more intrinsically-motivated employees, and (c) pay better in order to attract better-motivated workers who do not require variable incentives to perform well. However, employee self-selection will not necessarily attract the right employees (with all job applicants willing to profess intrinsic motivation and belief in the hiring organization's mission and

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[12] The law also prohibits tying NP and LG managers' compensation to profits.

vision). In a job market where the quality of information about job applicants is "subtle, nuanced and difficult to verify," social networks become preferable sources to impersonal ones to obtain reliable information about prospective employees (Granovetter, 2005, p. 33). Therefore, to screen applicants for their belief in an organization's mission, organizations may rely on their current employees, who may tap into their social networks to identify new key workers. Current employees may know their acquaintances' values in ways that screening by human resources staff cannot replicate.

In sum, the key elements of organization structure are predicted to differ, with NP and LG organizations delegating more decision-making to their employees, providing them with less direct incentives but more efficiency wages, monitoring them more, and recruiting them more often through the social networks of current workers than their FP counterparts.

(c) Pressures for similarity in structure and performance

The factors associated with organization type discussed above tend to generate differences in structure and performance. However, there are also strong pressures for similarity. Competition will force organizations to provide relatively similar combinations of product dimensions of interest to consumers (Steinberg, 1987). If consumers are not aware of the problem of asymmetric information or do not recognize differences among types of organization, then even organizations that do not want to take advantage of asymmetric information will be forced to do so and all organizations will provide identical products.[13] Government regulation is another force towards similarity in performance; in nursing homes, for example, various federal, state and local agencies establish and seek to enforce uniform practices and minimum standards of care. Professional workers, who receive similar training, are members of similar professional organizations and move across types of organization within the same industry constitute another force pushing towards similarity in structure and performance (DiMaggio and Powell, 1983).

Similarity may also arise from broad economic, technological and other developments that reduce the demand for alternative types of organization. Whereas historically-specific market failures have given rise to different types of organization, these may have changed with increased availability of information, competition, regulation, and other factors that weaken the need for different types of organization (Ben-Ner, 2002). Organizations of different types may grow increasingly alike in both structure and performance, although they may retain their initial designation of type due to various forces of inertia.

III. Data and Variables

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[13] This is, of course, a typical Akerlof-type 'lemons' problem (Akerlof, 1970) whereby bad products squeeze out good products. NP and LG organizations may cross-subsidize the desirable unobservable quality elements if they have special sources of income (James, 1983).

In this section we first provide some background information about nursing homes and their services. Next, we describe the datasets, sources and variables used in the analyses of organization structure and performance.

(a) The nursing home industry

A nursing home is a residence for individuals with physical or mental problems that prevent them from living on their own. Residents receive meals and assistance with daily activities as well as medical care but not of the intense kind provided by a hospital. The average nursing home in the United States has 109 beds and 93 residents. Most nursing homes operate separately from hospitals, but some are affiliated with one. Some nursing homes specialize in different types of care or medical conditions, but the majority of homes have residents with diverse medical conditions and ages. A little over half of nursing homes are part of a chain, and the rest are independent facilities. Of the 16,100 nursing homes in 2004, 61.5% were FP and 30.8% NP. The remaining homes were LG owned (city and county), with a small number of state and federal government-owned homes, mostly for military veterans.[14] The approximately 400 nursing homes in Minnesota have broadly the same characteristics as the national ones (82 residents on average, 51% belong to chains), except that the ownership distribution is skewed in favor of NP organizations. In Minnesota, only 27% of homes are FP and 60% are NP, whereas about 12% are LG owned. LG homes are independent of higher levels of government (at the state and federal levels). The few state-owned nursing homes are excluded from our analysis.

Nursing homes are subject to state and federal regulations that prescribe certain minimum practices concerning standards of care, housing, food and more. Regulators collect information about residents, staffing, quality of care and other matters, perform scheduled and unannounced inspections, issue letters of deficiencies when regulations are not met, and sometimes impose fines.[15] Regulations, inspections, data collection and dissemination and other means are required because residents are typically frail and vulnerable individuals who often enter a nursing home under the duress of a medical event that necessitates removal from their own homes, usually after first receiving intensive care in a hospital. Residents are commonly in a position of informational and power disadvantage for reasons of limited cognitive capacity. For example, most residents cannot evaluate the care they receive except *in extremis* (e.g., not receiving attention of nursing staff despite repeated requests), and cannot object effectively to being medicated with sedatives in order to make them more pliant or to be put to bed early. Family members cannot observe the substantive aspects of the care their relatives receive, thus

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[14] The statistics reported in this paragraph are drawn from National Center for Health Statistics (2004), Table 1.

[15] Practically all nursing homes (98.5% nationally) have residents who benefit from the federal Medicare and Medicaid programs hence they are all subject to these regulations. "Under contract with the Centers for Medicare & Medicaid Services (CMS), states conduct annual nursing home inspections, known as surveys, to assess compliance with federal quality and safety requirements. States also investigate complaints filed by family members or others in between annual surveys. When state surveys find serious deficiencies, CMS may impose sanctions to encourage compliance with federal requirements" (GAO, 2005).

being reduced to observe facilities and other factors that can be gleaned during visits but which may bear only little on the nature and quality of care. This puts family members, who generally make nursing home decisions, at a great informational disadvantage.

Most observers agree that regulation raises the standards of care beyond which would prevail otherwise, and improvements in data collection and enforcement have dramatically changed the situation as compared to that reported by Vladeck (1980). However, the problem of asymmetric information runs deep and it is hard even for professionally-trained observers to detect all problems. In its December 2005 report to the US Congress, the Government Accountability Office summarizes some of its findings as follows. "In the five large states we reviewed, federal surveyors concluded that the state surveyors had missed serious deficiencies in from 8 percent to 33 percent of comparative surveys—that is, these deficiencies existed and should have been identified at the time of the state survey… [A] sample of deficiencies demonstrated considerable understatement of quality-of-care problems such as serious, avoidable pressure sores." Moreover, enforcement is imperfect, so that homes found to violate regulations, even if they have done so repeatedly, are not always penalized (GAO, 2007).

Nursing homes provide personal care to individuals who find themselves in unfamiliar surroundings in the company of strangers around the clock and dependent on others – the nursing staff as well as other residents – for most of their physical, social and emotional needs. This relational element is likely to be important to residents but largely invisible to outsiders, including regulators and family members, and difficult to communicate for reasons discussed earlier as well as because of the 'subjective' nature of this dimension.

(b) Data sources and variables

The performance data are drawn from multiple regulatory sources concerning nearly all nursing homes in Minnesota in 2006; organization structure information is drawn from responses to a survey that was administered in 2005-6 to all Minnesota nursing homes. Description of the variables, descriptive statistics, and data sources are presented in Table 1.

1. Organizational performance dataset

Our performance data are drawn from regulatory sources concerning all nursing homes in Minnesota: (1) Online Survey, Certification, and Reporting database of the federal Centers for Medicare and Medicaid Services (OSCAR), (2) Minnesota Department of Health (MDH) and (3) Minnesota Department of Human Services (MDHS). The OSCAR dataset provides information about nursing home ownership, capacity, nursing inputs, violation of regulations, health condition of residents, and more; the data are collected in accordance with federal laws and regulations, supplemented by Minnesota laws and regulations.[16] The MDH data include

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[16] The OSCAR data are described in many places; see, for example, GAO (2005).

nursing home quality indicators constructed from the Minimum Data Set Assessment (MDS) reported regularly by nursing homes. There are 23 quality indicators adjusted for resident case mix, covering diverse areas and dimensions of care such as psychosocial, continence, infections, accidents, nutrition, pain, skin care, psychotropics, and functioning. MDHS data include resident satisfaction with their nursing home derived from a survey administered to a sample of residents in every Minnesota nursing home.[17] The resident survey contains 13 measures of resident satisfaction, adjusted for a home's resident case-mix.[18] The OSCAR and MDH & MDHS datasets were linked for the year 2006 for 369 homes, of which 99 are FP, 221 are NP, and 49 are LG owned.[19] We also linked 2000 U.S. Census data on each nursing home's ZIP code area to include the variable of average income of the local population.[20]

We use the *number of residents* as the measure of the quantity produced by a nursing home.[21] The average home in our sample has 82 residents, the smallest 15 residents, and the largest 458 residents; NP homes are the largest, followed by FP and LG homes. We employ several measures that capture different dimensions of quality and relational elements; these measures can be observed to different degrees by residents, family members, and regulators, so they arguably span a spectrum between observable Type I dimensions and unobservable Type II dimensions. We selected the variables so as to reflect our theoretical priors; the selection was also guided by a desire to use alternative data sources.

We use two variables as measures of relatively *observable elements* of nursing home performance: prevalence of *infections* and prevalence of *falls* among residents, both from the MDH database. Infections and falls are relatively easy to observe through normal interaction by visiting family with residents during regular visits, hence we think of these variables as comparatively observable quality elements. The prevalence of infections variable is the ratio of the number of different kinds of infections (pneumonia, respiratory infection, septicemia, viral hepatitis, wound infection, recurrent lung aspirations, and urinary tract infection) to the total number of residents in the nursing home within a standard time frame (since the most-recent full non-admission

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[17] Minnesota is one of a few states that administer such a survey; the first survey was administered in 2005.

[18] The 13 measures include safety, food enjoyment, control over living environment, satisfaction, and relationships (measures we use in the empirical work), as well as comfort, privacy, dignity, spiritual well-being, meaningful activity, autonomy, individuality, and mood. Residents are interviewed during a site visit and are asked to respond in one of the three manners: generally yes, generally no, and don't know/not applicable/no response. All measures are adjusted to reflect resident and facility characteristics (Minnesota Department of Health, 2006).

[19] We obtained the OSCAR dataset from the Medicare.gov website that contains home inspection data up to January 2008. The MDH home quality rating data were collected during the period between the fourth quarter of 2005 and the third quarter of 2006. The MDHS resident interview was conducted in July to August 2006. To match up the two data sources, we extracted home inspection data from OSCAR in the time frame between November 2005 and December 2006. For those homes that were inspected twice during the period, we used the information from the later inspection.

[20] Although we do not have information about the areas from which a particular home's residents are drawn, generally residents are drawn from locales near the nursing home. We use population characteristics in a home's ZIP code to approximate the characteristics of the population from which the home's residents are drawn.

[21] The number of residents is a count at the time of the regulatory survey. The distribution of the dates (month) when the three types of organization were surveyed does not differ statistically. Another common measure of quantity in nursing homes is the annual number of "patient-days" (e.g., McKay, 1988).

assessment for all kinds of infections, except for urinary tract infection, which is in the last 30 days before the current assessment). The prevalence of falls variable is the ratio of the number of accidental falls to the total number of residents in the nursing home within a standard time frame (in the last 30 days before the current assessment). The two variables are risk adjusted to account for residents' gender, age, length of stay and prior health condition. The infections variable has a mean of 0.11, a minimum of 0.01 and a maximum of 0.33; the falls variable has a mean of 0.12, a minimum of 0.01 and a maximum of 0.25.; the means of these variables vary only slightly among FP, NP and LG homes (see panel I of Table 1 and footnote 6 therein; t-tests of means of variables, comparing NP versus FP and LG versus FP are indicated by asterisks on the means of NP and LG).

We sought to investigate additional quality elements that can be assessed, with some effort and time, by family members during regular visits. We constructed three variables from resident surveys reported in the MDHS database concerning *food enjoyment* (the degree to which residents like the food), *safety* (the degree to which residents feel that they and their belongings are safe), and *adaptation to the living environment* (the extent to which residents feel that their immediate physical environment is comfortable). Family members may see and taste the food served to residents, and visit their rooms to judge the safety and comfort they provide. These measures thus can be thought of as *partially observable* elements. All three variables show higher means in NP and LG than in FP homes (statistically significant).

The number of *regulatory deficiencies* variable from the OSCAR database is the sum of 28 deficiency categories with over 150 regulatory standards that nursing homes must meet at all times, covering a wide range of aspects of resident life, from standards for the safe storage and preparation of food to protection of residents from physical or mental abuse and inadequate care practices. When an inspection team finds that a home does not meet a specific regulation, it issues a deficiency citation. The mean number of citations is 13, with 17 homes having no citations; the maximum number of citations is 39; FP homes have on average slightly more deficiencies than NP homes, and LG homes have least, but the differences are not statistically significant. This variable represents an aggregation of elements that vary in the degree of direct observability by family members or inference through discussion with residents. However, these elements are carefully studied by government inspectors; as noted earlier, government audits claim that not all deficiency are detected, further testimony to the unobservability problem. This suggests the possibility that underreporting of deficiencies will be correlated with the degree of unobservability of the elements that are subject to inspection, hence differences among types of organizations will tend to be underestimated. Data on individual homes drawn from regulatory inspections were made public on the internet in 2004 and will likely alleviate some of the asymmetric information and affect the decision-making of some consumers. However, at present the effect appears to be very small. A focus-group study conducted by the U.S. Department of Health and Human Services (2006) reports that patients and their family members were generally unaware of or found it difficult to use sources such as Medicare's Nursing

Home Compare website to facilitate the home selection process in a timely fashion. We thus think of the regulatory deficiencies variable as an index of *moderately unobservable* quality elements.[22]

Drug use is crucial to residents' health and thus an important aspect of nursing home care quality. However, information about drug use is usually opaque to residents, many of whom receive a large number of medications at different times of the day administered by a nurse. The administration of *antipsychotic drugs* without a diagnosis of psychosis is usually regarded with suspicion by experts; misuse of antipsychotic drugs in nursing homes has long been documented in the medical and public health literature (e.g., Ray, Federspiel and Schaffner, 1980; Avorn and Gurwitz, 1995). Such drugs may be used to pacify demanding residents and free up nursing staff to care for other residents. If antipsychotic drugs are indeed used for such purposes, then the variable measures *unobservable undesirable quality elements* of nursing home outcomes.[23] The variable is the ratio of the number of antipsychotic medications administered with a physician's prescription but without a diagnosis of psychosis during the last 7 days before the current assessment to the total number of residents in the nursing home.[24] This variable, collected by the MDH from drug prescription records, is adjusted for residents' gender, age and length of stay. The mean is 0.17, with a minimum 0.02 to a maximum of 0.81; the mean of this variable is highest for FP homes, and NP homes have the lowest incidence (statistically significant differences).

We also included two measures of *relational elements* from the resident survey: *satisfaction* captures the extent to which residents are satisfied with their social lives in the nursing home (mean 81.74, minimum 71.56 and maximum 89.92), and *relationship* is the degree to which residents report that there is a social, emotional and affective relationship between them and nursing staff as well as other residents (mean 81.94, minimum 66.32 and maximum 90.14). These two variables are also risk-adjusted for residents' characteristics and health conditions. These elements are *unobservable* to family members and are unlikely to be reported in a way that can be used for evaluation of a home; after all, being in a nursing home is a bad state, little fun, and for many, a

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[22] A simple count of regulatory deficiencies assigns equal weight to deficiencies in diverse areas whose relative importance cannot be assessed. We experimented with alternative definitions of this variable, including only some of the 28 deficiency categories, and the findings reported in the next section are robust to many alternative specifications. Te number of deficiencies in certain categories is small and there is little variation, so in some specifications of the variable no differences across types of organization are detected.

[23] Through regulatory interventions the situation might improve at times (e.g., Shorr, Fought and Ray, 1994), however, recently nursing homes have still seen a rise in prescription of antipsychotic drugs to their residents, and the appropriateness of the prescription is sometimes in doubt. A recent study using nationally representative data from the 2000–2001 Medicare Current Beneficiary Survey found that 58% of nursing home residents nation-wide receiving antipsychotic drugs took doses exceeding maximum levels, received duplicative therapy, or had inappropriate indications. The study found that, along with the appropriate prescription of such medications for treating symptoms of, for example, dementia with aggressive behaviors and schizophrenia, antipsychotic drugs were also used inappropriately on residents under unnecessary conditions such as memory problems, nonaggressive behaviors, or depression without psychotic features (Briesacher, Limcangco, Simoni-Wastila, Doshi, Levens, Shea and Stuart, 2005).

[24] Prescription of antipsychotics *with* medical justification, such as for residents with schizophrenia, delusional and mood disorder, Tourette's syndrome, Huntington's disease, acute manic, affective psychosis, hallucinations, and so forth, are excluded from the calculation.

last stage that does not connote with satisfaction. The means of both variables are higher in NP and LG homes than in FP homes (statistically significant).

In the estimations reported in the next section we control for the labor inputs of nursing staff, for registered nurses together with licensed practical nurses, and for certified nursing assistants. NP homes have the largest number of hours of both types of nursing staff, in part because they also have the largest number of residents. If we consider (instead of total hours) nursing staff hours per resident per day, we find that NP and LG homes have statistically significantly more nursing input per resident than FP homes.[25]

Control variables. As noted earlier, there are no price differences among nursing homes except those associated with the condition of a resident (reflecting the differential need for care) and geographic location. We control for various observable characteristics of each nursing home which may affect the frequency of visits by family members, the extent of competitive pressure in a nursing home's county, the degree to which operations may be standardized due to a home's participation in a chain or being part of a hospital, and more. Specifically, we include chain status, hospital affiliation, the proportion of Medicare residents, degree of market competition,[26] and per capita income in the ZIP code area where the nursing home is located as a representative of demographic characteristics of the home's geographic area.[27] More FP homes are part of a chain than NP homes, and nearly all LG homes are independent (of a chain). No FP homes are affiliated with a hospital (in Minnesota), but 16% of NP and 39% of LG are. There is no difference in the proportion of Medicare residents or the case mix index among the three types of nursing homes. LG homes are in areas of lower average incomes, as compared to FP homes, with NP homes in between these two.

2. Organization structure

In order to obtain information about elements of organization structure we developed and administered a survey, the Minnesota Nursing Homes Employer Survey (MNHES). The survey was administered to all nursing

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[25] The distribution of nursing hours in the three types of organization is as follows:

	NP	LG	FP
The total number of hours of registered nurses and licensed practical nurses per resident per day	1.30** (0.29)	1.28 (0.23)	1.22 (0.37)
The total number of hours of certified nursing assistants per resident per day	2.36*** (0.42)	2.55*** (0.37)	2.10 (0.53)

** two-tailed t-test $p<0.05$
*** two-tailed t-test $p<0.01$

[26] The degree of market competition a nursing home faces is measured by the Herfindahl-Hirschmann Index within the county where the nursing home is located. For each nursing home we computed the ratio of the number of residents in the home to the total number of residents in all nursing homes within the home's county; the total number of nursing home residents in the county proxies for total market demand.

[27] We assume that the demographics of the area represented by a nursing home's ZIP code are representative of the demographics of the home's residents.

homes identified in the OSCAR database in 2005,[28] with follow-up surveys mailed to non-respondents twice in the spring of 2006; 121 responded to the survey,[29] although because of missing information for different variables the usable sample size is 105: 69 NP, 18 FP, and 18 LG.[30] The response rate of approximately one-third is quite good in comparison with similar surveys.

The survey was addressed to nursing home administrators.[31] Several items focused on practices aimed at core employees, the nursing staff, which consists of registered nurses, licensed practical nurses, and certified nursing assistants. We constructed five variables that represent the organizational structure that affects the work of the nursing staff: delegation of decision-making, monitoring, selection, efficiency wages, and financial incentives. The measures represent weighted averages of survey responses reflecting each nursing group separately; the weighting is based on the number of employees in each group, with the exception of delegation of decision-making measure, which was constructed from responses that already lump together all nursing staff. (We repeated the analysis separately for each nursing group, with very similar results to those reported below).

Delegation of decision-making. The variable is an average of the reported degree of influence nursing employees have in seven areas: hiring of nursing staff, hiring of the executive director, expansion of facilities, change in services, menu planning, choosing of activities for residents, and determination of standards of care, ranging from 1 (*not at all*) to 5 (*extreme*). The sample mean is 1.99 with a standard deviation of 0.53, with the highest value in LG followed closely by NP, with FP last (statistically significant differences).

Selection. We asked about the main way for recruiting nursing staff, including 'cold call' by candidates, newspaper ads, online job services, referral by current employees, employment agencies and so on. We concentrate on referrals by current employees as an indicator of selection of employees through social networks. In our sample, 32% of nursing homes rely mainly on referrals, with the highest proportion in the NP group, then LG, and last, FP.[32]

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[28] There were 409 homes in the OSCAR dataset, but the number of nursing homes has been declining (the rise of alternatives such as assisted living being one important reason), so by the time of the survey there were fewer than 400 homes. We do not know the exact number because not all undelivered surveys were returned, and some homes that were in the process of closing were still receiving mail. The 369 homes that were discussed in the previous subsection are the result of merging two datasets, so an unknown but small number of homes may not appear in both.

[29] The responding nursing homes are fairly representative of the entire population. Nonparametric Mann-Whitney tests show that respondents are similar to non-respondents in home characteristics such as total number of residents, chain status, hospital affiliation, proportion of Medicare residents and resident case mix, but FP homes are under-represented among respondents: the population ownership distribution is about 60% NP homes, 13% LG homes, and 27% FP homes, whereas survey respondents are about 61% NP, 17 % LG, and 22% FP. These differences are not of great concern because our sample contains substantial variation that allows us to capture the relationships between the key variables of interest.

[30] We conducted nonparametric Mann-Whitney test comparing the 105 homes to those respondents who were left out of the analysis because of missing variables; the comparison involved organizational structure, home characteristics and external environment characteristics, and dimensions of performance. With the exception of home age and fringe benefits we did not find statistically significant differences.

[31] The survey is available at https://netfiles.umn.edu/users/benne001/www/papers/work-surv/Nursing-homes-survey.pdf.

[32] Several homes indicated more than one main recruiting method; if they included employee referral we classified them as selection through referral by current employees.

Efficiency wage (fringe benefits). We compared the hourly wage of each group of nurses in NP, LG and FP homes and found no statistically significant differences except for registered nurses in LG homes, who receive 8% more than their FP counterparts at the 0.10 significance level. However, total compensation, the measure of efficiency wages, includes fringe benefits such as pension plans, health insurance, paid vacation leave and paid sick leave. We do not have information about the monetary value of the fringe benefits nurses receive, but constructed two alternative measures, one that includes a count of all four benefits listed above, and another including only the major two benefits, pension plans and health plans. The variable including the four benefits has a sample mean of 3.64 and standard deviation of 0.63, whereas the variable based on two benefits has a mean of 1.72 and standard deviation of 0.52. Both measures show LG with the highest mean of benefits, followed by NP, then FP (statistically significant differences).[33]

Monitoring. The variable is based on the extent to which the work of nursing employees is monitored and supervised by supervisors and managers, ranging from 1 (*not at all*) to 5 (*extreme*). The sample average is 3.79, with a standard deviation of 0.79, with higher levels in NP and LG than FP (statistically significant differences).

*Financial incentives (merit-based pay raise). S*tandard pay-for-performance incentives are not used in nursing home environment because generally results cannot be associated with the actions of a particular nurse. Instead, nursing homes that do seek to use incentives may grant merit-based pay raises. Merit-based pay raises are typically based on broad performance evaluation criteria. In our sample, 26% of homes rely on merit for pay raises for nursing staff (alternative bases for pay raises include supervisor discretion, across-the-board, promotion, and seniority): 34% of FP firms, 31% of LG and 23% of NP homes.

Control variables. We control for home characteristics that may be associated with various elements of organization structure, including size, measured by the total number of residents, chain status, and whether the nursing home is affiliated with a hospital. We also include the county-level Herfindahl-Hirschmann market concentration index to account for possible pressures or opportunities for learning that may drive nursing homes to adopt similar structures.

IV. Empirical Strategy and Results

As we have reported in the previous section, the descriptive statistics in Table 1 reveal differences among FP, NP and LG nursing homes. Regarding organization structure, we note that FP nurses have least influence, while LG nurses have most. Wage rates are essentially the same for all groups of nurses across the different types of ownership (with the exception of the LG advantage noted earlier). FP homes provide

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[33] It is beyond the scope of this paper to investigate why NP and LG organizations would prefer to offer the same base wage but higher levels of fringe benefits in order to achieve a better pay package than their FP counterparts. One possible explanation is a paternalistic attitude on the part of NP leaders.

significantly fewer fringe benefits than their NP and LG counterparts (the difference appears also in the two-benefit variable, not shown in the table). A higher proportion of FP homes rely on merit-based pay raises than NP and LG homes. NP and LG homes rely more on monitoring of nurses than FP homes. Finally, NP and LG homes rely more on recruiting new nurses through referral by current nurses than do FP homes.

Regarding performance variables, for a crude efficiency comparison one may compare the number of hours of the two types of nursing inputs per resident and note, as we have done above (see also footnote 25, above) that FP homes devote fewer nursing staff hours per resident than NP and LG homes. This is initial evidence suggestive of inferior productive efficiency in NP and LG homes, but we need of course to consider other dimensions of performance that also use nursing staff; indeed, some use this ratio as an indicator of quality. For other dimensions the pattern generally favors NP homes over FP counterparts, with LG homes generally in between these two. Furthermore, the differences in means increase with the presumed degree of unobservability: there is no statistically significant difference in the *prevalence of falls* and the difference in *prevalence of infections* is small, NP and LG homes perform better in other performance elements including *food*, *safety*, and *adaptation to the living environment*. *Regulatory deficiencies* show smaller difference but still in favor of NP homes, and the NP advantage is significantly higher in the comparison of *prevalence of antipsychotics*, and relational goods, *resident satisfaction* and resident satisfaction with *relationships*.

The differences in means of variables representing organization structure and performance generally accord with our theoretical predictions. However, a more careful investigation is necessary because these differences may be spurious or generated by factors that differ across the three types of organization. The remainder of this section investigates in detail within the framework of regression analyses the differences in organization structure and performance among the three types of organization.

(a) Organization structure

To investigate differences in organization structure, we estimate separately the individual elements as a function of nursing home ownership and various control variables. To acknowledge the simultaneous determination of the elements and to account for the possibility of common sources of noise in the data, we use seemingly unrelated estimations. The results are shown in Table 2. Compared to FP homes, NP homes have significantly more delegation of decision-making and provide significantly greater fringe benefits; they also rely more on network selection of new employees and monitor more their employees (the difference in both cases is significant only at the 0.10 level), and rely less on merit-based pay (statistically insignificant differences). The differences between LG and FP homes are similar to the difference between NP and FP homes, except that where the difference between NP and FP is only marginally significant (selection and monitoring) the

difference between LG and FP is statistically insignificant (the differences between NP and LG homes in these two elements are statistically insignificant).

A very similar pattern of differences is detected if the five equations are estimated separately based on the characteristics of the dependent variables, using ordered-logit estimate for decision-making, logit estimate for network selection and merit-based pay, OLS for fringe benefits, and tobit estimate for monitoring. The significance levels are as in the SUR estimations presented in Table 2 (except that the significance of the estimate on NP in the selection equation increases).

To examine the possible endogenous determination of the various elements of organization structure, we also implemented a three-stage simultaneous estimation (3SLS). This structural estimation reflects our theoretical framework for understanding the relationships among the various elements of organization structure, a discussion of which goes beyond the scope of this paper. The results (available upon request) are consistent with those in Table 2, with few differences (the estimate on monitoring becomes negative but loses statistical significance).

(b) Organizational performance

To predict the level of different elements of organizational performance and examine differences in performance across organizations with different ownership, we adopt a partial Cobb-Douglass production function framework. Each quantity or quality element - various nursing home outcomes - is produced by the inputs of the nursing staff, controlling for chain, hospital affiliation, proportion of Medicare residents, degree of market competition, and per capita income in the ZIP code area, and is augmented by organization type dummies.[34] The production function is partial because we do not have the inputs of non-nursing labor and capital.[35] For outcome variables that vary with the size of a nursing home – the number of residents and the number of regulatory deficiencies – we represent the input of the nursing staff by the *number of hours per day* provided by registered nurses and licensed practical nurses and by certified assistant nurses. For quality outcomes where the quality of inputs may be critical, we use the *proportion* of the number of hours provided by registered and licensed practical nurses in the total number of nursing hours.

We approach the estimation of performance in two stages. First, we predict separately various outcome measures in a seemingly unrelated regression framework (to account for the potential correlation of error terms among equations); the results are presented in Table 3. Next we allow for the possibility of tradeoffs between

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[34] Recall from the description of variables that all quality performance outcomes are adjusted for resident case mix and in certain cases, where relevant, also for gender, age and length of stay.

[35] To understand the significance of the omission of other inputs, note that we are using the separate inputs of three different types of nursing staff, from highly-trained registered and licensed nurses to certified nursing assistants, who together account for 66% of nursing homes employment (Gabrel, 2000); nurses' combined wages account for about 81% of nursing home revenue in our survey sample.

quantity and quality in production imposed by the alternative use of nursing staff time and effort; SUR estimation of quantity and two quality measures (the number of regulatory deficiencies and relationship) is presented in Tables 4a-4d.

Table 3 reports the results for seemingly unrelated estimates, starting with quantity (the number of residents) and continuing with quality and relational elements arranged in decreasing order of observability by residents' families. As explained in the section on data and variables, the degree of observability is based on our perceptions and is obviously subjective. The regression reported in Table 3 is well determined and the estimates on various variables are sensible (in particular, the estimate on the total hours of registered and licensed practical nurses is 0.454, S.E. 0.050) and on the hours of certified nursing assistants' input is 0.436, S.E. 0.047). The first column shows that FP homes outperform both NP and LG homes in the number of residents they serve. The estimates are statistically significant, indicating 5.2% fewer residents served on average by NP homes and 11% fewer in LG homes, as compared to FP homes.

The diverse measures of quality exhibit a pattern of NP homes doing at least as well as FP homes on some measures, and outperforming them on others. On the one hand, compared to FP homes, NP homes provide as much or more of the desirable outcomes (food enjoyment, sense of safety, sense of adaptation to the living environment, general satisfaction and satisfaction with relationships in the home, all measures derived from resident surveys). On the other hand, NP homes have less of the undesirable outcomes (measures reported by nursing homes or recorded by regulators) than FP homes, including fewer regulatory deficiency citations and fewer administrations of antipsychotic drugs that were not prescribed for a diagnosed condition (significant at 0.1 level); the other two undesirables, falls and infections, are not distinguishable between the two types of organization. Quality-related outcomes in LG homes are quite similar to NP homes, although generally not quite as good on the undesirable measures.[36]

These results may be summarized as follows. Given a certain nursing staff, FP homes serve larger numbers of residents than NP and especially LG homes, hence are more efficient. However, FP homes generally provide lower quality care, especially for less observable attributes, than NP homes, and more moderately, less than LG homes. These findings generally support our prediction that FP homes will be more efficient and also more willing to exploit asymmetric information than NP and LG homes. However, this

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[36] We used the prevalence of *back pressure sores* from the OSCAR dataset as an alternative measure to the unobservable element. Pressure sores have been used in the literature as an indicator of nursing home quality that is unobservable to family members, particularly of immobile residents (e.g., Cawley, Grabowski and Hirth, 2004; Grabowski and Hirth, 2003). There are three alternative measures (described in Table 1): the proportion of high-risk long-stay residents with back pressure sores, the proportion of low-risk long-stay residents with back pressure sores, and the proportion of short-stay residents with back pressure sores. For various reasons, data is not available for all nursing homes (there are 252, 106, and 180 homes with data for these three variables, respectively). Results show that NP homes consistently have a lower proportion of residents with back pressure sores (not significant for the two long-stay measures, but significant at the 0.10 level for the short-stay measure). No significant difference is detected in the comparison between LG and FP homes.

interpretation may be contrasted with the alternative interpretation that these findings reflect a tradeoff between quantity and quality. Under this interpretation, it is not differences in efficiency or willingness to exploit informational advantages that differentiates among types of organization, but the type of service or market niche different types of organization serve. Thus FP homes are in the higher quantity/lower quality niche and they allocate their resources (primarily nurses) to serve larger number of residents, whereas NP homes are in the lower quantity/higher quality niche supported by a suitable resource allocation, and LG similar to NP homes. This interpretation requires price differentials to reflect the quality differentials, but as noted already, in Minnesota there are no price differentials. Alternatively, this interpretation may apply even in the absence of price differentials if potential residents or their families (and third-party payers) are unaware of quality differences because of asymmetric information or do not care about them, or if they cannot choose a nursing home (e.g., because of location considerations).

To explore the possibility of a tradeoff between quantity and quality, and between different elements of quality, we estimated quantity as a function of the variables in the first column of Table 3 but added quality measures as explanatory variables, and estimated measures of quality as in Table 3, adding measures of quantity and quality as explanatory variables. We report here the estimation of the relationship between the number of residents, regulatory deficiencies, and satisfaction with relationships. Regulatory deficiencies and satisfaction with relationships represent different aspects of quality and relational elements, and are derived from different data sources. These three variables appear to exhaust many, possibly most, possibilities of using the two kinds of nursing input for alternative purposes and thus capture well the tradeoff issue that we seek to investigate.[37] We explore tradeoffs in four separate SUR estimations, one in a three-way tradeoff possibility that considers the number of residents, regulatory deficiencies and relationship together (Table 4a), and then two-way tradeoffs (Tables 4b, 4c and 4d) that are open to a more direct interpretation.

Table 4a shows the relationships among three variables that compete for the same nursing inputs. Strict tradeoff relationships cannot be determined in this set of three-way equations, but certain conclusions may be drawn. Consider the first column estimating the number of residents as function of the number of regulatory deficiencies and relationship, as well as organization type and control variables. A mild tradeoff can be detected, with the sign on the estimate on regulatory deficiencies, an undesirable outcome, is positive and the sign on the estimate on relationship is negative. In the second column we detect competition between the number of residents and relationship on the one hand, and regulatory deficiencies, on the other hand. The third column shows a tradeoff between relationship and the number of residents but no relationship to deficiencies. This set of estimates suggests that higher quality comes, at the margin, at the expense of serving fewer residents (serving more residents implies lower quality of service), although we can conclude much about the tradeoff between the

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[37] It would not make sense to include in the estimation of tradeoffs all the variables in Table 3, because many are jointly produced.

two dimensions of quality. The finding of a tradeoff between quantity and quality does not imply that the alternative interpretation adduced in the previous paragraph regarding different niches is correct. The tradeoff finding only means that the organizations in the sample operate, at least in a limited way, in an economic way if not necessarily at maximum efficiency. Importantly, after controlling for the possibility of tradeoffs, the NP and LG estimates remain at approximately the levels estimated in Table 3, suggesting that the efficiency differences and quality differences remain. Hence on the basis of Table 4a we cannot accept the alternative interpretation that FP, NP and LG operate on the same tradeoff (production possibilities) curve but at different locations and that there are no other differences. Table 4a is consistent with our predictions.

To obtain additional information about the issue of tradeoffs we estimated sets of two equations determining only two outcomes at a time. Tables 4b and 4c confirm previous findings: first, that there is a tradeoff between the number of residents and quality, one dimension at a time, and second, that the differences among the three types of organization that we found in Table 3 are detected here as well. In Table 4d we examine the issue of tradeoff between the two dimensions of quality, the number of regulatory deficiencies and relationship. We do not find a tradeoff, but that high quality in one dimension is associated with high quality in the other dimension, just as low quality in one is associated with low quality in the other. This suggests that an emphasis on quantity comes at the expense of quality in both dimensions examined here. The differences among types of organization are reproduced here, too.

We attempted to examine the endogenous determination of the outcome variables included in Tables 4a-4d in a structural 3SLS estimation. The estimations (available upon request) are poorly determined, especially the three-way tradeoffs system. The problem stems from unavailability of satisfactory instruments, on which could not improve because of lack of alternative measures in our datasets.

Differences among different sub-types of FP firms and NP organizations. In the foregoing discussion we treated FP, NP and LG organizations as prototypical organizations and ignored possible variations within each type that may affect the severity of agency problems as well as organizational objectives.[38] We replicated the analysis of Table 3, distinguishing between chain and autonomous FP and NP homes. Here we are not interested in developing and testing hypotheses about the effects of chain versus independent ownership in NP and FP, but only want to test the robustness of our previous findings to the inclusion of chain ownership. The results (reported in Appendix A) suggest that although there are differences between chain and independent FP

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[38] In all prior analyses we include a dummy for chain, but it did not differentiate between FP and NP chains. For example, a FP home that belongs to a chain may have a longer principal-agent chain and therefore experience more severe agency problems than an owner-controlled local home, with implications for both technical efficiency and the willingness to take advantage of asymmetric information; likewise, the operations of a locally-controlled NP organization may be more visible to its board and stakeholders and its objectives may be more aligned with community desires than would be the case with a large organization that has facilities in many communities.

homes as well as between chain and independent NP homes, the broad differences between NP and FP homes carry over also to the further classification that includes chain ownership.[39]

One hears the argument that religious institutions are populated by more intrinsically-motivated and dedicated employees, such as nuns, than in other NP organizations. On this argument, religious NP nursing homes will show less inefficiency and perhaps a relative gain in the relational elements as compared to secular NP homes. We split the NP sample by secular and religious homes, and replicated the estimation reported in Table 3. The results (presented in Appendix B) show great similarity between secular and religious NP homes, although the religious ones appear indeed marginally more effective and less likely to administer antipsychotics drugs than secular ones, the differences between the two sub-types of NP homes are statistically insignificant.[40]

V. Discussion and Conclusions

In this paper, we proposed a comparative theoretical perspective on the structure and performance of for-profit, nonprofit and local government (FP, NP and LG) organizations. These three types of organization have different ownership structures and different objectives and therefore they are likely to face different governance issues, recruit different kinds of employees, encounter different agency problems, and perform differently on a wide range of measures. Our argument is that, in comparison with FP firms, NP and LG organizations:

(1) have more attenuated ownership claims and therefore suffer more severe agency problems and although these problems are mitigated by their choice of organization structure, they are not eliminated, leading to lower productive efficiency in NP and LG organizations; however, recruiting of and self-selection by some managers and employees who support these organizations' goals may attenuate (and even reverse) this effect;

(2) focus on consumer well-being rather than profit maximization and therefore take less advantage of consumer vulnerabilities such as inferior information and *ceteris paribus* provide higher-quality products.

We investigated empirically the implications of these hypothesized differences, focusing on a narrowly-defined and homogenous industry where all three types of organization coexist, nursing homes. Concerning *organization structure*, our analysis of responses to an original employer surveys provided by 105 Minnesota nursing homes provides broad support to our predictions. The analysis suggests that, as compared to FP homes, NP homes delegate more decision-making power to their employees, provide them with efficiency wages (via greater fringe benefits), tend to hire them through social networks; in addition, they monitor employees slightly more and are slightly less likely to offer them financial incentives. LG homes are somewhere between NP and

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[39] Not that in the Appendix C table the omitted category is independent FP homes, whereas in Table 3 is all FP homes. Appendix C comparisons suggest that most hypotheses regarding the differences between FP and NP carry over to various sub-type FP and NP comparisons. Such a detailed comparison is beyond the scope of this paper.

[40] The only statistically significant difference is found for the *food enjoyment* variable, where religious homes have an advantage over secular ones (p<0.10).

FP homes in terms of their organization structure. There is very little relevant research on nursing homes and other industries against which we can compare this set of results. One exception is DeVaro and Brookshire (2007), who use an employer survey concerning promotion and incentive practices in FP firms and NP organizations. They find that NP organizations are less likely to offer promotions, and the promotions that they do offer are less likely to be based on job performance or merit. Furthermore, echoing the findings of Roomkin and Weisbrod (1999) and Bertrand, Hallock and Arnould (2005) for hospital executives, DeVaro and Brookshire (2007) find that NP workers are less likely to receive commissions on sales, bonuses and profit sharing than their FP counterparts. These results are weakly consistent with our results, in that the weak differences between FP on the one hand and NP and LG homes on the other hand, although in the predicted direction, are weaker than those found in other industries most likely because there are few pay-for-performance opportunities in the nursing home environment. Our finding regarding efficiency wages echoes Ito and Domian's (1987) finding that NP orchestras paid musicians higher wages than their FP counterparts, who explained the difference as an efficiency wage due to less measurable outcomes in NPs. These differences arise from NP organizations' need and opportunity to delegate decision-making to workers in lower rungs of the hierarchy, and the need to motivate them in the absence of the overall profit motive for the organization.

Regarding *performance and outcomes*, our empirical investigation of a sample of 369 nursing homes in Minnesota, using data collected by regulatory agencies, provides support for our theoretical predictions. Nursing homes provide services that have elements that are observable by consumers or their sponsors – residents or their families – as well as elements that are not observable, at least not by families. They also provide an important relational element present in any personal care industries, tender loving care – or otherwise – which also happens to be largely unobservable to families. Using a production function framework for each of the performance outcomes, we found that, as compared to FP homes, NP and LG homes (the latter to a lesser degree) provide better outcomes for residents, particularly so in terms of elements that are arguably less well observed by residents and their families. From resident overall satisfaction to satisfaction with their relationships in the home to the use of antipsychotic medication without a diagnosis requiring it, to the overall number of deficiencies identified by regulators, and more, NP homes provide better results than FP homes, with LG homes' results lying in between these two. However, NP and LG homes are less efficient than FP homes in terms of standard productive efficiency measures.

We examined the possibility that FP, NP and LG homes operate similarly in terms of efficiency and treatment of quality, but offer different combinations of quality and quantity dimensions of their service (although such possibility would make sense only if prices of different packages can differ, which they cannot, in Minnesota, if consumers are completely ignorant of quality differences, or if they cannot choose among

homes). We found that after controlling for the tradeoff between quantity and quality the differences between FP, NP, and LG homes generally remain.

Our results are robust to most alternative econometric specifications and to classifications of types of ownership. For organization structure, we attempted structural estimation, which despite the small sample, produced similar results. For organization performance, we reproduced the general results when we distinguished between FP and NP chain and independent homes (separately), and when we considered separately secular and religious NP homes. We also attempted structural estimation and most of the results were reproduced, but in some specifications efficiency differences between FP and NP and LG disappear. It is impossible to determine whether this is because of the sensitivity of 3SLS estimation to specification and the choice of instruments, or because there are no efficiency differences.

Our findings are similar to those we reviewed in the Introduction section, and to findings from the hospital industry. In these industries it appears that FP firms are more efficient than NP organizations (e.g., Nyman and Bricker, 1989; Kessler and McClellan, 2002), but NP organizations produce higher quality of care as compared to FP status (e.g., Rosenau and Linder, 2003). Horwitz (2007) finds that NP hospitals produce different services than their FP counterparts along dimensions where administrators can influence profitability, consistent with differences in objectives; Picone, Chou and Sloan (2002) find that hospitals converting from NP or LG status to FP status are associated with decline of quality (mortality), but not the other way around; Weisbrod and Schlesinger (1986), Spector, Selden and Cohen (1998), Hirth (1999), Chou (2002), Grabowski and Hirth (2003) and Santerre and Vernon (2005) find that NP nursing homes provide services in a way that exploits less consumer informational disadvantages than do FP homes. Since price is closely regulated in the nursing home industry, and more so in Minnesota as one of only two states (along with North Dakota) that require rate equalization between privately-paid and Medicaid residents, nursing homes do not have latitude to adjust their rates to match the costs of their enhanced services and quality (O'Neill et al., 2003). Therefore, the differences between FP firms and NP and LG organizations appear to be driven by differences in objectives rather than by the possibility that different types of organizations specialize in low-price—low-quality versus high–price—high-quality market segments.[41]

Are the differences among structure and performance among different types of organization sustainable on the long run? We have not addressed this interesting question, except to observe that the factors that generate demand for alternatives to FP firms, asymmetric information in particular, may diminish over time. Further investigation of this question is required. For example, one important question is whether there is substantial self-selection by customers into different types of organization. Self-selection may be based on recognition by customers (residents or their families who place them in nursing homes) that asymmetric information between

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[41] Horwitz and Nichols (2007) provide detailed discussion and evidence on differences in the objectives of NP and FP hospitals.

providers of care and recipients of care cannot be eliminated, leading some customers to make the selection of a nursing home on the basis of organizational type, with those fearing the consequences of asymmetric information opting for NP and LG homes over FP ones. On the long run, with Internet information about nursing homes already available and more to become available in the future, and with the increase of public awareness of and ability to use online information, asymmetric information will be temporary and isolated, hence the advantages of NP and LG organizations will dissipate, and to the extent that their principals choose to keep them in business, there will be increasingly fewer differences between them and FP homes.

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Table 1. Variable Definitions, Sources and Summary Statistics

Variable Name	Variable Definition	Sample Mean (Std. Dev.)	Sample Range	NP Mean (S.D.)	LG Mean (S.D.)	FP Mean (S.D.)	Data source[1]
I. Variables for Organization Performance Estimations - 369 Nursing Homes							
Organization Type							
NP	1- nonprofit 0-otherwise	0.60	0/1	-	-	-	OSCAR
LG	1- local government 0- otherwise	0.13	0/1	-	-	-	OSCAR
FP	1- for-profit 0- otherwise	0.27	0/1	-	-	-	OSCAR
Organization Performance							
Number of residents	Total number of residents	81.99 (48.19)	15-458	88.15** (50.91)	62.84** (35.26)	77.73 (44.80)	OSCAR
Regulatory deficiencies	Total number of regulatory deficiencies. Examples of violations include failure to: "provide enough notice before discharging or transferring a resident," "give each resident care and services to get or keep the highest quality of life," "prepare food that is nutritional, appetizing, tasty, attractive, well-cooked…," "provide clean bed and bath linens that are in good condition," "protect each resident from all abuse, physical punishment…," "provide care in a way that keeps or builds each resident's dignity and self respect," "give each resident care and services to get or keep the highest quality of life," "use a registered nurse at least 8 hours a day, 7 days a week," and so on.	13.09 (6.69)	0-39	13.01 (6.77)	12.84 (5.71)	13.38 (7.01)	OSCAR
Prevalence of new falls	Number of falls in the last 30 days (before the current assessment is conducted) to number of residents.	0.12 (0.03)	0.01-0.25	0.12 (0.03)	0.12 (0.03)	0.12 (0.04)	MDH
Prevalence of infections	Number of pneumonia, respiratory infection, septicemia, viral hepatitis, wound infection, or recurrent lung aspirations since most-recent full non-admission assessment or urinary tract infection in the last 30 days (before the current assessment is conducted) to number of residents.	0.11 (0.04)	0.01-0.33	0.12* (0.04)	0.10 (0.04)	0.11 (0.04)	MDH
Food enjoyment	Items: "Do you like the food here?" "Do you enjoy mealtimes here?" and "Can you get your favorite foods here?"	84.75 (4.99)	65.53-92.89	84.93** (4.84)	86.09*** (4.58)	83.68 (5.36)	MDHS
Safety	Items: "Are your belongings safe here?" "Do your clothes get lost or damaged in the laundry?" and "Do you feel safe and secure?"	86.64 (3.63)	71.85-93.8	86.93** (3.34)	86.94** (3.28)	85.83 (4.29)	MDHS
Environment	Items: "Is it easy for you to get around in your room by yourself?" "Are your belongings arranged so you can get them?" "Can you get the things you want to use in your bathroom?" and Do you take care of your own things as much as you want?"	88.26 (3.02)	76.75-94.17	88.54*** (2.86)	88.19 (3.33)	87.67 (3.13)	MDHS
Prevalence of antipsychotics	Number of using antipsychotic medications without diagnosis of psychosis in the last 7 days (before the current assessment is conducted) to number of residents.	0.17 (0.08)	0.02-0.81	0.16*** (0.06)	0.17* (0.08)	0.20 (0.10)	MDH
Satisfaction	Items: "Is there somebody to talk to here if you have a problem?" "Do the people who work here spend enough time with you when giving you care?" "Do you understand the people who work here when they talk to you?" "Do the people who work here listen to what you say?" "Do the people who work here explain your care to you?" "Do you consider any of the other people who live here a friend?" "Do the people who work here knock on your door and wait to be invited in?" "Are you alone too much?" "Do the people who work here ever get angry at you?" "Would you recommend this nursing home to someone who needs care?" and "Overall, what grade would you give this nursing home, where A is best it could be and F is worst it could be?"	81.74 (3.36)	71.56-89.92	82.15*** (3.11)	82.33*** (3.17)	80.52 (3.70)	MDHS
Relationship	Items: "Do the people who work here ever stop by just to talk?" "Do you consider anybody who works here to be your friend?" and "Can you get help when you need it?"	81.94 (4.24)	66.32-90.14	82.27*** (4.11)	82.80*** (3.87)	80.76 (4.48)	MDHS
Back pressure sores I [2]	Percent of high-risk long-stay residents who have pressure sores	7.81% (4.38%)	0-22%	7.64% (4.31%)	7.43% (2.83%)	8.46% (5.02%)	OSCAR
Back pressure sores II [3]	Percent of low-risk long-stay residents who have pressure sores	1.50%	0-7%	1.53%	1.29%	1.48%	OSCAR

		(1.78%)		(1.91%)	(1.70%)	(1.52%)	
Back pressure sores III [4]	Percent of short-stay residents who have pressure sores	11.76% (6.76%)	0-30%	11.04%** (6.52%)	11.69% (7.58%)	13.30% (6.93%)	OSCAR
Labor Inputs							
RNs and LPNs	Total number of hours of registered nurses (RNs) and licensed practical nurses (LPNs) per day	104.77 (67.36)	11.40-613.72	114.84*** (72.72)	80.20* (48.54)	94.46 (58.12)	OSCAR
CNAs	Total number of hours of certified nursing assistants per day	190.43 (117.51)	9.76-966.38	207.81*** (122.10)	158.62 (88.58)	167.37 (113.23)	OSCAR
Control Variables							
Chain status	1 if the nursing home belongs to a chain operation; 0 if independent.	0.51	0/1	0.55*	0.02***	0.65	OSCAR
Hospital affiliation	1 if the facility is affiliated with a hospital; 0 otherwise	0.15	0/1	0.16***	0.39***	0	OSCAR
Proportion of Medicare residents	Proportion of residents whose stay is paid for by Medicare	0.09 (0.05)	0-0.41	0.09 (0.05)	0.09* (0.04)	0.10 (0.06)	OSCAR
Herfindahl-Hirschmann Index	$HHI_i = (100 \times \dfrac{NH_i \# residents}{county \# NHresident s})^2$	2455.08 (1943.78)	276.50-10000	2472.25 (1944.28)	3456.95*** (2138.38)	1920.85 (1634.38)	OSCAR & ZIP code
Case mix index [5]	Intensity of care and services provided to residents in each nursing home	1.01 (0.09)	0.60-1.30	1.01 (0.08)	1.00 (0.06)	1.02 (0.11)	MDH
Per capita income in the ZIP code area ($)		20106.74 (4927.23)	9821-45402	19883.01*** (4570.52)	17893.90*** (1999.42)	21701.40 (6097.65)	2000 Census

II. Variables for Organization Structure Estimations – 105 Nursing Homes							
Organization Type							
NP	1- nonprofit 0-otherwise	0.66	0/1	-	-	-	OSCAR
LG	1- local government 0- otherwise	0.17	0/1	-	-	-	OSCAR
FP	1- for-profit 0- otherwise	0.17	0/1	-	-	-	OSCAR
Organization structure							
Delegation of decision-making	RNs, LPNs and CNAs' participation in decision-making in (5-point scale,1-not at all to 5-extreme): (1) Hiring of executive director or similar position; (2) Hiring of RNs, LPNs, and CNAs; (3) Expansion of facilities; (4) Change in the services offered; (5) Menu planning; (6) Choosing activities for residents; (7) Determination of standards for care of residents	1.99 (0.53)	1-3.57	2.01*** (0.54)	2.21*** (0.48)	1.69 (0.43)	MNHES
Selection of new employees	1 if referral by current employees was the main way through which the most recently hired nursing employee was first identified; 0 otherwise	0.32	0/1	0.37**	0.25	0.16	MNHES
Fringe benefits	Number of fringe benefits (pension plan, health insurance, paid vacation leave and paid sick leave) received by most nursing employees (1-4)	3.64 (0.63)	2-4	3.69*** (0.59)	3.94*** (0.24)	3.12 (0.76)	MNHES
Monitoring of nursing staff	The extent to which nursing employees have their work monitored and supervised by supervisors and managers? (1-not at all to 5-extreme)	3.79 (0.79)	2-5	3.86* (0.79)	3.79 (0.74)	3.51 (0.85)	MNHES
Merit as basis for pay raise	1 if merit ranks as one of the top two criteria for determining individual nurse's pay raise; 0 otherwise	0.26	0/1	0.23	0.31	0.34	MNHES
Control Variables							
Home size	Total number of residents currently reside in the nursing home	79.84 (40.88)	19-207	82.64 (39.35)	67.89 (34.84)	81.06 (51.32)	MNHES &

						OSCAR
Chain status	1 if the nursing home belongs to a chain operation; 0 if independent.	0.48	0/1	0.55	0.06***	0.61	OSCAR
Case mix index	Intensity of care and services provided to residents in each nursing home	1.00 (0.09)	0.65-1.26	1.00 (0.08)	1.00 (0.04)	1.01 (0.14)	MDH
Hospital affiliation	1 if the facility is affiliated with a hospital; 0 otherwise	0.15	0/1	0.12***	0.44***	0	OSCAR
Herfindahl-Hirschmann Index	$HHI_i = (100 \times \dfrac{NH_i \text{ \# residents}}{county \text{ \# } NHresidents})^2$	2474.74 (1709.64)	276.50-10000	2462.20 (1588.44)	2955.39* (2266.11)	2042.13 (1486.58)	OSCAR & ZIP code

Notes:

1. MNHES - Minnesota Nursing Homes Employer Survey; available at https://netfiles.umn.edu/users/benne001/www/papers/work-surv/Nursing-homes-survey.pdf

   OSCAR - Online Survey, Certification and Reporting data of nursing facilities (Centers for Medicare and Medicaid Services). http://www.cms.hhs.gov/NursingHomeQualityInits/

   MDH - Minnesota State Department of Health; details available at http://www.health.state.mn.us/nhreportcard/

   MDHS - Minnesota State Department of Human Services; details available at http://www.health.state.mn.us/nhreportcard/

2. 252 nursing homes (170 NP's, 23 LG's, and 59 FP's).

3. 106 nursing homes (68 NP's, 7 LG's, and 31 FP's).

4. 178 nursing homes (112 NP's, 13 LG's, and 53 FP's).

5. For details on the definition and calculation of case mix see http://www.health.state.mn.us/divs/fpc/profinfo/cms/8_21manual.pdf .

6. *, ** and *** indicate significance of the one-tailed t- test at the 0.10, 0.05, and 0.01 levels, respectively, for the comparison between NP and FP, and LG and FP nursing homes.

Table 2. Organization Type and Structure:

SUR Estimations [1,2]

Independent Variables	Delegation of Decision-Making	Selection	Efficiency Wages (Fringe Benefits)	Monitoring	Incentives (Merit-Based Pay)
NP	0.304**	0.209*	0.389***	0.393*	-0.156
	(0.135)	(0.118)	(0.137)	(0.206)	(0.109)
LG	0.421**	0.137	0.579***	0.411	-0.228
	(0.190)	(0.166)	(0.193)	(0.291)	(0.154)
Control variables [3]	Yes	Yes	Yes	Yes	Yes
N	105	105	105	105	105
χ^2	11.75	4.87	24.39	5.37	8.90
Prob>χ^2	0.07	0.56	0.00	0.50	0.18
"R-sq"	0.10	0.04	0.19	0.05	0.08

Notes:
1. Among the 105 nursing homes included in the analysis, 18 are FP, 69 NP and 18 LG.
2. *, ** and *** indicate significance at the two-tailed 0.10, 0.05, and 0.01 levels, respectively. Robust standard errors are in parentheses.
3. For all estimations we control for firm size (number of residents), chain, hospital affiliation, and degree of market competition.

Table 3. Organization Type and Performance

SUR Estimations[1,2,3]

	Quantity					*Quality*				
	Observable ←--→ *Unobservable*									
Independent Variables	Number of Residents	Falls	Infections	Food	Safety	Environment	Regulatory Deficiencies	Antipsychotics	Satisfaction	Relationship
NP	-0.052**	0.047	-0.018	0.010	0.011*	0.015***	-0.268**	-0.140*	0.015**	0.020**
	(0.022)	(0.052)	(0.063)	(0.009)	(0.007)	(0.006)	(0.113)	(0.077)	(0.006)	(0.008)
LG	-0.110***	0.045	-0.126	0.022*	0.012	0.011	-0.090	-0.055	0.014*	0.029***
	(0.028)	(0.069)	(0.082)	(0.012)	(0.009)	(0.007)	(0.147)	(0.101)	(0.008)	(0.011)
Inputs of RNs, LPNs and CNAs	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Control variables [4]	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	369	369	369	369	369	369	369	369	369	369
χ^2	5412.64	31.36	41.04	49.32	28.79	27.93	33.10	42.77	63.03	40.24
Prob> χ^2	0.00	0.50	0.13	0.03	0.63	0.67	0.46	0.10	0.00	0.15
"R-sq"	0.94	0.08	0.10	0.12	0.07	0.07	0.09	0.10	015	0.10

Notes:

1. Among the 369 nursing homes included in the analysis, 99 are FP, 221 NP and 49 LG.
2. All variables except for organization type, chain status and status of hospital affiliation dummies are in natural logarithm form. Estimations based on levels yield similar results.
3. *, ** and *** indicate significance at the two-tailed 0.10, 0.05, and 0.01 levels, respectively. Robust standard errors are in the parentheses.
4. For all estimations we control for chain, hospital affiliation, proportion of Medicare residents, degree of market competition, and per capita income in the ZIP code area.

Table 4a. Organization Type and Performance, Controlling for Tradeoff between Quantity and Quality SUR Estimations[1,2,3]

Independent Variables	*Quantity* Number of Residents	*Quality* Regulatory Deficiencies	Relationship
NP	-0.043** (0.022)	-0.237** (0.115)	0.022*** (0.008)
LG	-0.102*** (0.028)	-0.021 (0.152)	0.026** (0.011)
Number of residents		0.450* (0.273)	-0.022*** (0.006)
Regulatory deficiencies	0.016 (0.010)		-0.004 (0.004)
Relationship	-0.242* (0.136)	-0.659 (0.716)	
Inputs of RNs, LPNs and CNAs	Yes	Yes	Yes
Control variables [4]	Yes	Yes	Yes
N	369	369	369
χ^2	5369.16	39.14	56.68
Prob> χ^2	0.00	0.29	0.01
"R-sq"	0.94	0.09	0.13

Notes:
1. Among the 369 nursing homes included in the analysis, 99 are FP, 221 NP and 49 LG.
2. All variables except for organization type, chain status and status of hospital affiliation dummies are in natural logarithm form.
3. *, ** and *** indicate significance at the two-tailed 0.10, 0.05, and 0.01 levels, respectively.
4. For all estimations we control for chain, hospital affiliation, proportion of Medicare residents, degree of market competition, and per capita income in the ZIP code area.

Table 4b. Organization Type and Performance, Controlling for Tradeoff between Quantity and Quality
SUR Estimations[1,2,3]

Independent Variables	Quantity — Number of Residents	Quality — Regulatory deficiencies
NP	-0.049** (0.022)	-0.252** (0.114)
LG	-0.109*** (0.028)	-0.039 (0.150)
Number of residents		0.462* (0.273)
Regulatory deficiencies	0.017* (0.010)	
Inputs of RNs, LPNs and CNAs	Yes	Yes
Control variables [4]	Yes	Yes
N	369	369
χ^2	5357.18	38.28
Prob> χ^2	0.00	0.28
"R-sq"	0.94	0.09

Notes:

1. Among the 369 nursing homes included in the analysis, 99 are FP, 221 NP and 49 LG.

2. All variables except for organization type, chain status and status of hospital affiliation dummies are in natural logarithm form. Estimations based on levels yield similar results.

3. *, ** and *** indicate significance at the two-tailed 0.10, 0.05, and 0.01 levels, respectively.

4. For all estimations we control for chain, hospital affiliation, proportion of Medicare residents, degree of market competition, and per capita income in the ZIP code area.

**Table 4c. Organization Type and Performance, Controlling for
Tradeoff between Quantity and Quality
SUR Estimations**[1,2,3]

Independent Variables	*Quantity* Number of Residents	*Quality* Relationship
NP	-0.048** (0.022)	0.023*** (0.008)
LG	-0.103*** (0.028)	0.026** (0.011)
Number of residents		-0.033* (0.020)
Relationship	-0.251* (0.136)	
Inputs of RNs, LPNs and CNAs	Yes	Yes
Control variables [4]	Yes	Yes
N	369	369
χ^2	5356.59	55.81
Prob> χ^2	0.00	0.01
"R-sq"	0.94	0.13

Notes:

1. Among the 369 nursing homes included in the analysis, 99 are FP, 221 NP and 49 LG.

2. All variables except for organization type, chain status and status of hospital affiliation dummies are in natural logarithm form. Estimations based on levels yield similar results.

3. *, ** and *** indicate significance at the two-tailed 0.10, 0.05, and 0.01 levels, respectively.

4. For all estimations we control for chain, hospital affiliation, proportion of Medicare residents, degree of market competition, and per capita income in the ZIP code area.

Table 4d. Organization Type and Performance, Controlling for
Tradeoff between Quantity and Quality
SUR Estimations[1,2,3]

Independent Variables	Quality (relatively observable)	Quality (relatively unobservable)
	Regulatory deficiencies	**Relationship**
NP	-0.256**	0.019**
	(0.115)	(0.008)
LG	-0.062	0.028**
	(0.149)	(0.011)
Regulatory deficiencies		-0.007*
		(0.004)
Relationship	-0.981	
	(0.715)	
Inputs of RNs, LPNs and CNAs	Yes	Yes
Control variables [4]	Yes	Yes
N	369	369
χ^2	37.93	43.42
Prob> χ^2	0.29	0.11
"R-sq"	0.09	0.10

Notes:

1. Among the 369 nursing homes included in the analysis, 99 are FP, 221 NP and 49 LG.

2. All variables except for organization type, chain status and status of hospital affiliation dummies are in natural logarithm form. Estimations based on levels yield similar results.

3. *, ** and *** indicate significance at the two-tailed 0.10, 0.05, and 0.01 levels, respectively.

4. For all estimations we control for chain, hospital affiliation, proportion of Medicare residents, degree of market competition, and per capita income in the ZIP code area.

Appendix A. Organization Type and Performance – Chain vs. Independent Homes

SUR Estimations[1,2,3]

Independent Variables	Quantity	Quality								
		Observable ←---→ Unobservable								
	Number of Residents	Falls	Infections	Food	Safety	Environment	Regulatory Deficiencies	Antipsychotics	Satisfaction	Relationship
NP Independent	-0.045	0.011	-0.048	-0.010	-0.004	0.006	-0.275*	-0.243**	0.005	0.011
	(0.028)	(0.066)	(0.080)	(0.012)	(0.009)	(0.007)	(0.145)	(0.098)	(0.008)	(0.011)
NP Chain	-0.068**	0.102	-0.032	0.001	0.001	0.009	-0.233*	-0.272***	0.001	0.013
	(0.027)	(0.064)	(0.077)	(0.012)	(0.008)	(0.007)	(0.141)	(0.095)	(0.008)	(0.010)
LG	-0.104***	0.020	-0.154*	0.006	-0.001	0.005	-0.075	-0.128	0.005	0.020*
	(0.032)	(0.076)	(0.092)	(0.014)	(0.010)	(0.008)	(0.165)	(0.112)	(0.009)	(0.012)
FP Chain	-0.001	0.005	-0.124	-0.027**	-0.023**	-0.005	-0.244	-0.182*	-0.028***	-0.013
	(0.030)	(0.072)	(0.086)	(0.013)	(0.009)	(0.008)	(0.155)	(0.106)	(0.009)	(0.011)
Inputs of RNs, LPNs and CNAs	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Control variables [4]	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	369	369	369	369	369	369	369	369	369	369
χ^2	5021.93	16.79	21.99	28.36	17.52	8.98	13.24	23.03	36.58	15.79
Prob> χ^2	0.00	0.05	0.01	0.00	0.04	0.44	0.21	0.01	0.00	0.07
"R-sq"	0.93	0.04	0.06	0.07	0.05	0.02	0.04	0.06	0.09	0.04

Notes:
1. Among the 369 nursing homes included in the analysis, 99 are NP independent, 122 NP chain, 35 FP independent, 64 FP chain, and 49 LG. For-profit independent homes are the omitted group.
2. All variables except for organization type, chain and status of hospital affiliation dummies are in natural logarithm form. Estimations based on levels yield similar results.
3. *, ** and *** indicate significance at the two-tailed 0.10, 0.05, and 0.01 levels, respectively. Robust standard errors are in the parentheses.
4. For all estimations we control for chain, hospital affiliation, proportion of Medicare residents, degree of market competition, and per capita income in the ZIP code area.

Appendix B. Organization Type and Performance – Nonprofit Secular vs. Religious Homes

SUR Estimations[1,2,3]

Independent Variables	Quantity	Quality								
		Observable ←---→ Unobservable								
	Number of Residents	Falls	Infections	Food	Safety	Environment	Regulatory Deficiencies	Antipsychotics	Satisfaction	Relationship
NP Secular	-0.057**	0.045	-0.043	0.004	0.014*	0.015***	-0.230*	-0.124	0.015**	0.020**
	(0.023)	(0.056)	(0.067)	(0.010)	(0.007)	(0.006)	(0.120)	(0.082)	(0.007)	(0.009)
NP Religious	-0.041	0.050	0.027	0.020*	0.007	0.014**	-0.342**	-0.170*	0.016**	0.022**
	(0.026)	(0.062)	(0.074)	(0.011)	(0.008)	(0.007)	(0.135)	(0.091)	(0.008)	(0.010)
LG	-0.112***	0.045	-0.132	0.021*	0.013	0.011	-0.080	-0.050	0.014*	0.028***
	(0.028)	(0.069)	(0.082)	(0.012)	(0.009)	(0.007)	(0.148)	(0.101)	(0.008)	(0.011)
Inputs of RNs, LPNs and CNAs	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Control variables [4]	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	369	369	369	369	369	369	369	369	369	369
χ^2	5418.57	31.37	42.44	52.78	29.80	27.96	34.34	43.18	63.05	40.31
Prob> χ^2	0.00	0.55	0.13	0.02	0.63	0.72	0.45	0.11	0.00	0.18
"R-sq"	0.94	0.08	0.10	0.13	0.07	0.07	0.09	0.10	0.15	0.10

Notes:

1. Among the 369 nursing homes included in the analysis, 99 are FP, 154 NP secular, 67 NP religious, and 49 LG. For-profit homes are the omitted group.

2. All variables except for organization type, chain and status of hospital affiliation dummies are in natural logarithm form. Estimations based on levels yield similar results.

3. *, ** and *** indicate significance at the two-tailed 0.10, 0.05, and 0.01 levels, respectively. Robust standard errors are in the parentheses.

4. For all estimations we control for chain, hospital affiliation, proportion of Medicare residents, degree of market competition, and per capita income in the ZIP code area.