Managing in the Regulatory Thicket:

Regulation Legitimacy and Expertise in U.S. Nursing Homes

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Practitioner Points

1. Organizations experiencing fair and effective government regulation are more likely to deliver high quality services. Thus, investing in government inspectors' training to help insure a speedy, fair, transparent, and consistent inspection process can help improve service providers' perceptions of regulation and their commitment to reducing regulatory violations. These changes are especially important in the context of nonprofit and for-profit nursing homes.
2. In nursing home care, the providers' communication with government regulators fails to mitigate and resolve the regulated entities' performance problems. Regulatory agencies should recognize that communication with the regulated entities may be used as a tool to not only identify or investigate performance concerns, but also improve performance.
3. Excessive commitment to external expectations may undermine organizational ability to manage staff, promote innovations, resolve internal problems, and prevent service deficiencies from occurring.

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Abstract

While the influence of government regulation on organizations is undeniable, empirical research in this field is scarce. This study investigates how the understanding of and attitudes towards government regulation among public, nonprofit, and for-profit managers affect organizational performance, using U.S. nursing homes as the empirical setting. Our findings suggest that managers' perceptions of regulation legitimacy – views of regulation fairness, inspectors' effectiveness, and internal utility of the mandates – positively affect service quality. Sub-group analysis suggests that the managers' views of regulation matter in nonprofit and for-profit, but not public organizations. In nonprofit homes, performance declines when managers report higher regulatory expertise – better knowledge of the regulatory standards. In for-profit facilities, frequent communication with regulators lowers quality. These findings suggest that the regulated entities' views of government regulation are central to their success, which necessitates improvements in the regulatory process.

Introduction

Government performance is affected by resources, personnel, structure, stakeholder support, market conditions, and other factors (Andersen and Mortensen 2009; Boyne 2003; Boyne and Meier 2009; Brewer and Selden 2000; Lynn, Heinrich and Hill 2000). Regulation is one factor that has emerged as a source of public sector improvement (Boyne 2003). Conceptualized as external control of public and private actors, regulation is expected to correct the consequences of market and government failures (James 2000; Lowery 1998). The complexity of relationships between regulators and the regulated, however, may result in regulatory failures that attenuate the effect of regulation on performance (James 2000; Boyne 2003). Although regulators clearly affect organizations, actual empirical research is rare. This study uses U.S. nursing homes to investigate how the views of government regulation among public, nonprofit, and for-profit managers affect performance.

This article operationalizes the constructs of administrators' *regulatory expertise*, perceptions of *regulation legitimacy* and *frequency of contact with regulatory agencies* and explores their impact on nursing home quality. Controlling for past performance, the analysis suggests that nursing home quality improves along with the managers' perceptions of regulation legitimacy. Meanwhile, no change in quality is found in organizations whose managers had higher regulatory expertise. Also, higher frequency of contact with government regulators is associated with a decline in quality. Subgroup analysis suggests that regulation legitimacy matters in nonprofit and for-profit, but not government organizations.

The findings contribute to several bodies of literature. First, understanding managerial views and competencies related to regulation and their effect on performance is important in the age of contracting, public-private partnerships, and "the hollow state." With myriad "agents"

delivering publicly-funded services, the prevalence of regulatory activity has been rising (James 2000). In the U.S., accidents like the Deepwater Horizon oil spill or the Flint city water crisis have drawn attention to regulatory failures. Thus, understanding how regulation affects organizations is increasingly important.

Second, this research contributes to the literature on policy compliance (Anderson 2015; Scholz 1984; Stover and Brown 1975). Few policies are self-implementing, and governments rarely commit sufficient resources to rigorous enforcement (Meier 1985); regulation, therefore, often relies on voluntary compliance by the regulated (Scholz 1991; Potoski and Prakash 2005). This literature links voluntary compliance to such factors as the complexity of the regulations and beliefs by the regulated that the regulations are fair (Bullock and Rodgers 1976; Stover and Brown 1975). Complexity matters because individuals might not understand the regulations (Anderson 2015; Scholz 1984). Fairness also matters: Scholz and Pinney (1995) find that individuals who perceive that regulations are reasonable and enforced fairly are more likely to pay taxes they owe. Nursing homes are an ideal case to examine regulatory compliance. A highly salient public policy in most nations, nursing home care is a good example of an elaborate and complex, federally-mandated, state-administered regulatory regime applied across public, nonprofit, and for-profit providers. Regulation is critical in this market characterized by dependent and cognitively limited clientele, low service measurability, extensive third-party financing, high costs to acquire regulatory expertise, and under-resourced regulating agencies. While this unique context affects the generalizability of our findings, the concepts of regulatory expertise and regulation legitimacy should be highly generalizable, given that all regulatory compliance presupposes knowledge and perception of those regulations. The practical implications of this study underscore the need to achieve buy-in from the regulated: improve the

fairness and quality of the assessors and assessment process, and promote ways to use performance data to make internal management decisions.

Perspectives on Government Regulation

The definition of government regulation used here draws from public administration and policy research (Ashworth, Boyne and Walker 2002; Barrow, 1996; Boyne 2003; Hood, James and Cross 2000; James 2000). Regulation involves government bodies ("regulators") that (1) are independent from organizations subject to regulation ("regulated entities"); (2) operate under legal mandates pertaining to quality assurance, levels of public spending, transparency or other aspects of the regulated entities' performance, (3) set standards governing the regulated entities, (4) monitor the regulated entities using a range of instruments, and (5) control regulated entities using sanctions or rewards to bring them into compliance with the standards.

In recent decades, as governments have accepted the self-regulating aspects of the market, government has moved away from economic regulation to focus on health and safety issues (Carrigan and Coglianese 2011; Derthick and Quirk 2001), a trend continued by the New Public Management (NPM) movement (Barrow 1996; Hood et al. 2000; James 2000). NPM advocated for increased managerial autonomy, and regulation became critical in monitoring the outsourced services. As a result, government regulation has become more specialized and complex (Hood et al. 2000; Jakobsen and Mortensen 2016).

Regulation encompasses many complementary instruments: certifications, audits, site visits, peer-evaluations, review of self-reported data, annual reports, performance indicators, financial controls, and general communication (Ashworth et al. 2002; Boyne, Day and Walker 2002; Hood et al. 2000). The intensity and mode of regulation vary (Barrow 1996; Boyne et al. 2002). As the main regulatory instrument in our study, inspection is a key form of regulation

that examines organizational compliance with service standards and the attainment of various outcomes for service users (Boyne et al. 2002).

Presumed to be conducted with the public interest in mind, regulation seeks to improve the performance of regulated entities (Boyne 2003). Nonetheless, regulatory failures often occur since "[r]egulation is an imperfect method of directing and controlling the behavior of public organizations" (Ashworth et al. 2002, 209; James 2000; Lowery 1998). The literature identifies numerous factors inhibiting effective regulation. Among these, the regulators' expertise contributes to the effectiveness of regulation by minimizing providers' compliance burden and goal displacement; meanwhile, inconsistency of regulation, e.g., inconsistent interpretation of standards, can send mixed messages to regulated entities and undermine their performance (Boyne et al. 2002). Problems can also arise from the regulators' or the regulatees' acting in their own interest. The regulators may wish to expand the scope of regulation for their individual benefit (James 2000). The regulated entities may show resistance towards regulation stemming from the tradition of self-regulation (such as in health care), high levels of professionalism (professional bureaucracies value autonomy), fear of goal displacement, or disillusionment with the utility of performance measurement (Ashworth et al. 2002; Barrow, 1996; Boyne et al. 2002). When the regulators and the regulated become too close, regulatory capture may occur when the regulators prioritize the benefit of the regulated entities over the policy (Boyne et al. 2002; Hughes, Mears and Minch, 1997; James 2000). Additionally, various policy-specific sources of regulatory problems can complicate regulation or create resistance to it such as multiple regulators and regulatory instruments (Boyne 2003; Hughes et al. 1997), performance ambiguity and data problems (Ashworth et al. 2002), costs (James 2000), market competition, as well as risk and uncertainty (Hughes et al. 1997).

In the U.S., compliance with government regulation varies greatly with high levels of compliance in equal employment and disability access and resistance to environmental regulations (Konisky and Teodoro 2015). While the theories of regulation are fairly advanced, few empirical studies explore government regulation and organizational performance (Barrow, 1996; Boyne et al. 2002; James 2000). Ashworth and colleagues (2002) found evidence of regulatory capture in a sample of Welsh agencies and determined that using multiple instruments improved regulation, while the level of professionalization and publicness did not. Studying development agencies, Molnar and Rogers (1976) found that the number of federal, state, and local regulators had a positive effect on goal attainment and resources. D'Aunno, Hooijberg, and Munson (1991) found that hospitals, which are less influenced by regulators, improved research funds and patient/staff satisfaction. An extensive literature finds that state and local governments' favorable environments, resources, and commitment to equal employment opportunity (EEO) laws improve performance (see Miller, Kerr and Reid 2010; Saltzstein 1986, also see literature cited therein). Overall, however, as Boyne (2003: 379) notes, the literature on regulation is "sparse, weak and incomplete" with the biggest gap being in how regulatory instruments lead to improvements.

Study Objectives

This study focuses on the regulated entities' knowledge and perceptions of regulation and their effect on performance. We create a measure of *regulatory expertise*, which refers to managers' knowledge of the regulatory requirements. We also create a measure of perceived *regulation legitimacy*, which refers to the managers' (1) perceptions of regulation fairness, (2) perceptions of regulators' effectiveness, and (3) internal adoption/use of externally mandated performance standards. Consistent with the public interest model of regulation, higher

regulatory expertise and regulation legitimacy may be positively associated with performance. Organizations that better understand the standards will have less resistance, identify and correct performance gaps early, and do better programmatically (Anderson 2015). Organizations that perceive regulation as fair and effective will have clearer expectations and be more committed to compliance (Scholz and Pinney, 1995). Additionally, those who use standards internally are less likely to perceive the process as ritualistic, and hence will benefit more from regulation.

These propositions can be challenged if one relaxes the assumption of benevolent regulation. The rational choice literature (see Buchanan and Tullock 1962; Niskanen 1971) suggests that political and administrative actors are self-interested: rather than promoting substantive policy goals, career bureaucrats seek to maximize budgets and their attendant power gains, salaries, prestige, discretion, and promotional opportunities. They are incentivized to misallocate resources, oversupply services, and extend political favors. In the nursing home context, regulators may want to legitimize and expand the scope of regulation to extend political favors to legislators or providers; they may change the intensity of content or enforcement of regulation (e.g., inflate resulting violations to limit provider entry into markets (James 2000)). If these forces are at play, regulated entities' knowledge of regulation system or its legitimacy will not affect performance.

Providers of care, in turn, prioritize not only quality, but also profits and admissions. Even when fair and effective, government regulation may be perceived as a distraction from service delivery. Commitment to learning the mandates or applying them internally may backfire by undermining core activities. Elimination of bed sores or medication administration errors may be a function of meticulously followed routines, technical innovations, and positive work climate, rather than variation in knowledge and views on regulation. Additionally, providers may

be interested in increased regulatory burden to shut the competition out (James 2000). These arguments support the null hypothesis on the effect of regulatory expertise and legitimacy on performance.

The data permit accounting for other factors central to the study of regulation. First, since regulation expertise and legitimacy may be a function of past favorable inspections, the analysis controls for past performance. Second, many empirical studies use the frequency of contact with regulators as a proxy for regulatory activity. While this study has direct measures for the variables of interest, the analysis also includes frequency of contact as a control variable. Third, public choice theorists suggest that mixed-service markets are guided by mixed objectives (Niskanen 1971). By incorporating public, for-profit, and nonprofit organizations in our analysis, this article explores the effect of favorable perceptions of the regulatory process across sectors. Ashworth and colleagues (2002) argue that public organizations have no choice but to comply out of fear of sanctions, so regulatory expertise and legitimacy may matter less in this sector (but see Konisky and Teodoro 2015). Also, one may expect that government organizations in general may be more committed to government mandates, and hence any variation in experiences with the regulators may be less important. In the private sector, poor experiences with regulators might reduce motivation and commitment to compliance. Fourth, an advantage of a single-policy-field study is that many of contextual sources of regulatory failures, such as measurability, data problems, and compliance costs, are kept constant.

The study also includes measures of general management capacity that has been found to influence organizational performance (Andrews, Boyne and Walker 2006; Boyne 2003; Brewer 2006; Meier and O'Toole 2002; 2003; Nicholson-Crotty and O'Toole 2005). Management capacity is a multi-dimensional concept, and the measure of regulatory expertise is one of its

many dimensions. In the absence of other measures, regulatory expertise may become a proxy for the administrators' general management competence (capacity to learn, plan, and understand performance). Accordingly, our framework accounts for general management capacity in a number of ways. First, the analysis includes a measure of *innovation management* (Berry 1994; Gabris, *et al*. 1999; Stewart and Kringas 2003). Scholars have suggested that nursing home leadership is critical in creating more flexible and innovative arrangements to reduce costs and correct system flaws (Deutschman 2005). For example, adoption of new medication distribution technology enhances performance by helping to identify errors and building patient-focused care (Baril, Gascon and Brouillette 2014). In nursing homes, where employees' attitudes are generally unfavorable to cultural change (Palmer et al. 2013), change managers are especially important.

Additionally, the models account for managers' capacity to manage outward and pursue boundary work – protect organizational autonomy, buffer organizations from hostile forces, obtain resources, and create partnerships (Moore 1995; Rainey and Steinbauer 1999). Nursing home administrators spend considerable time dealing with external issues of regulation or accreditation (Castle, Ferguson and Hughes 2009). Thus, the model accounts for *external management*.

Numerous public management studies also suggest that *shared decision-making* (and related concepts of collaborative, distributed, or participatory management) can improve performance by improving job satisfaction, promoting efficiency, and reducing conflict and ambiguity (Brewer and Selden 2000; Dearden, Carter, David, Kowalski and Surridge 1999; Gronn 2008; Harris 2008; Kim 2002; Oshagbemi and Gill 2003; Raelin 2012). In health care, shared decision-making was found to enable service improvements and staff engagement (Rondeau and Wagar 2001; Tomlinson 2012).

Finally, the models account for the administrators' *work experience*, often used as a proxy for management expertise. The four measures of management, combined with the measure of past performance, help ensure that our measures of *regulatory expertise* and *regulation legitimacy* capture knowledge of and views on regulation, rather than management capacity. The next section provides an overview of regulation in the context of U.S. nursing homes.

Regulation of U.S. Nursing Homes

Nursing homes, representing one of the most regulated markets in the United States, are residential facilities that provide room, meals, and skilled nursing assistance to individuals with complex chronic disabilities. Since the 1800s, charitable almshouses, old-age homes, and insane asylums have served the needs of disabled persons. In the 19th century, some states mandated the creation of public poorhouses (Trattner, 1999). With the establishment of Social Security (1935), Medicare, and Medicaid programs (1965), disabled citizens began receiving care from non-governmental facilities that were reimbursed by public programs (Pepper, 1982). Gradually, for-profit providers became dominant representing 65% of U.S. nursing homes, with nonprofit and governmental homes representing 28% and 7%, respectively (Amirkhanyan, Kim, and Lambright 2008).

Nursing home reimbursements by Medicare and Medicaid are tied to facilities' compliance with federal and state mandates (Kane, 1998). The Medicaid program pays for the largest share of clients, followed by Medicare, private long-term care insurance, and out-of-pocket payments. The CMS establish federal guidelines for all Medicare and Medicaid certified nursing homes, but regulation is delegated to state agencies. Standards are enforced via unannounced annual inspections, as well as through a range of sanctions. A team of trained inspectors evaluates a nursing home's compliance with over 180 federal and state standards

pertaining to quality of care, resident assessment, resident rights, physical environment, dietary services, pharmacy services, administration, and others. Inspection teams review organizational records, observe operations for several days, and interview residents and staff. An identified violation is recorded as a "health deficiency" and can result in sanctions ranging from in-service training, to monetary penalties, de-certification, and termination. These inspections are designed to be rigorous in response to past scandals and evidence of exploitation (Kane, 1998). CMS produce public data on facility characteristics, health violations, as well as five-star ratings of health care quality, created to help simplify the data (CMS, n.d.b). Regulation costs over $400 million from federal and state budgets, or $20,000 per nursing facility, annually (Walshe 2001; Walshe and Harrington 2002).

Despite these vast efforts, poor quality of care is still a major concern for practitioners, clients, and regulators (Harrington 2001). There is no agreement on what is broken in the system. Nursing home regulation is criticized for both high compliance burden and lax performance standards (Harrington 2001; Kane, 1998; Walshe 2001). Some concerns stem from regulators' actions. The punitive nature of regulation has emerged as an industry-wide problem: regulated entities are seen as inherently bad, and a perfect survey is suggestive of insufficient regulator diligence (NYAHSA 2001; Walshe 2001). Consequently, inspectors may feel pressured to over-report deficiencies. Second, regulators may lack expertise in conducting inspections that detect problems without misjudging what they observe (Harrington 2001; NYAHSA 2001). Third, multiple and redundant systems for certification, licensure, and accreditation, each entailing extensive reporting, create a fragmented system (NYAHSA 2001; Walshe 2001). Fourth, regulatory instruments focus more on inputs and processes rather than outcomes (e.g., patient well-being). In long-term care, quality is traditionally defined as absence of adverse

events, which affects the nature of regulation. Finally, variation in the interpretation of regulatory standards, sanctions, and timeliness is found across jurisdictions (NYAHSA 2001).

Additional concerns stem from the actions of regulated entities. The nursing home industry may be vulnerable to regulatory capture, occurring when the industry's political contributions to elected officials increase its influence over regulation and its outcomes (Walshe 2001). Resistance, goal displacement, cheating, and defensive strategies to meet the compliance burden have also been reported (Kane 1998; Thomas 2014).

Clearly, nursing home regulation is complex and needs improvement. Research on regulation and its effects on care quality is limited. The latter is often explained by the absence of a meaningful comparison group (i.e., all nursing homes are regulated) and the fact that nursing home performance data are the product of regulation itself (Walshe 2001).

Methodology

Data

This analysis uses a unique hybrid dataset that combines archival data with a recent survey of nursing home managers. Such data are particularly valuable and rare in the public management literature (Boyne, Meier, O'Toole and Walker 2006; Meier and O'Toole 2013). First, the analysis uses Nursing Home Compare (NHC), national administrative data created by the CMS (CMS, n.d.b) based on state agencies' quality assessment of all Medicare and Medicaid certified nursing homes. NHC is unbalanced panel data with multiple observations for each facility. For each nursing home, the latest record contains information collected during the most recent inspection period as of January 1, 2014 (i.e., 9-15 months prior to January 1, 2014). The panel we used (N=15,695) contains all Medicare and Medicaid certified nursing homes operating as of January 1, 2014. The dataset contains facility names, addresses, federal provider numbers,

ownership status, size, occupancy, hospital affiliation, staffing, and other characteristics.

Our second dataset is the Texas A&M University (TAMU) Nursing Home Administrator Survey, administered between January and May of 2013 (Compton, Calderon & Meier, 2013). The year of this survey (2013) coincides with the latest annual wave of data selected from the NHC dataset (surveys conducted within 9-15 past months of January 2, 2014). The survey was mailed to a random sample of 1000 for-profit and 1000 nonprofit homes, as well as to *all* 903 governmental nursing homes operating at the time. The total of 725 online or on-paper surveys were completed in three waves producing a response rate of 25%. After removing six duplicate records, occurring as a result of respondents' filling out both online and hard copies, the final sample included 717 organizations. As shown in appendix A, the population of all nursing homes is similar to this sample in terms of key characteristics, tabulated by sector. The sample is somewhat more likely to include better-performing facilities, which has implications for generalizability of the findings (see *Discussion* section). Overall, Table 1 suggests that despite the modest response, rate this sample is representative of the population.

The Area Health Resource Files (AHRF), the third data source, are public data produced by the U.S. Bureau of Health Professionals. It includes county-level data on the prevalence of health care organizations and socio-economic data. Combining these three datasets allows analysts to minimize common source bias: the variables on regulation are self-reported by nursing home administrators, while the data on performance and the broader context come from governmental datasets (Meier and O'Toole 2013).

Dependent Variables: **Service Quality**

Two archival measures of nursing home quality are used in this research. The total number of health deficiencies includes regulatory deficiencies identified during a single standard

inspection or as a result of a formally verified complaint. This measure can range between zero and 180 (the total possible violations); however, most nursing homes are assigned a very modest number of violations. In these data, the range of violations assigned is between 0 and 31, with the mean of 5.9. Health deficiencies have been widely used in health policy and nursing care research for over three decades, and are generally regarded as valid, reliable, and fairly comprehensive measures of quality (Harrington et al., 1998; Mullan and Harrington 2001; O'Neill et al. 2003). These violations pertain to one of eight broad categories of performance: quality of care, resident behavior and facility practices, resident assessment, resident rights, physical environment, dietary services, pharmacy services, administration and regulation. To highlight their diversity, below is a sampling of specific regulations (for complete listing see CMS 2015):

> "The resident has the right to be free of interference, coercion, discrimination, and reprisal from the facility in exercising his or her rights."
> "A resident who enters the facility without an indwelling catheter is not catheterized unless the resident's clinical condition demonstrates that catheterization was necessary."
> "An individual resident may self-administer drugs if the interdisciplinary team, as defined by §483.20(d)(2)(ii), has determined that this practice is safe."
> "The facility must provide clean bed and bath linens that are in good condition"
> "A facility with more than 120 beds must employ a qualified social worker on a full-time basis."

With regulations that vary in terms of breadth and depth, it is hard for nursing homes to teach their staff "to the test." The regulatory system is fairly comprehensive and does not encourage compliance with a narrow set of issues. The numbers of deficiencies assigned during different inspections are modestly correlated: the Pearson's correlation coefficient between the number of health deficiencies assigned during the 2013-2012 surveys and 2011-2010 surveys conducted in the same facilities was 0.34.

The data on health deficiencies has been publicly available for decades. In 2008, to popularize these data, the CMS developed five-star ratings of nursing home care quality (CMS n.d.c). Thus, as an alternative measure, the overall 5-star ratings are used. They are computed by the CMS using a formula based on: (a) 5-star health inspection rating, reflecting health deficiencies during the past three years, with the more recent surveys weighted more heavily; (b) 5-star staffing rating, reflecting staffing per resident per day adjusted for residents' needs; and (c) 5-star quality rating, reflecting quality measures derived from patient clinical data. A higher rating reflects higher quality of care.

Central Independent Variables: **Regulatory Competence and Other Variables**

Four items from the TAMU Survey measure providers' views of the regulatory process. Respondents were asked to what extent they strongly agreed (4), agreed (3), disagreed (2), or strongly disagreed (1) with the following statements:

1. I am very familiar with the 180 regulatory standards used by the state to evaluate our nursing home.
2. The number of deficiency citations assigned to our nursing home by the state inspectors during the latest inspection represents a fair measure of quality of our nursing home.
3. Performance standards that we use internally to evaluate the quality of care in our nursing home are similar to those used by the state.
4. I believe state inspectors did a good job administering the latest health inspection of our nursing home.

Factor analysis was used to examine these items. Item 1 has somewhat lower factor loadings, and conceptually measures knowledge rather than views, perceptions, or approval. Thus, a dummy

variable measuring regulatory expertise was created, coded as 1 for those who "strongly agreed" with Item 1. "Strongly agree" responses were used to minimize the positivity bias. Items 2, 3, and 4 were combined into a regulation legitimacy scale (Cronbach's alpha = 0.74). Only one factor had an eigenvalue greater than 1 (1.98), and three items had high factor loadings: 0.88, 0.66, and .88. Thus, factor analysis suggested that using these items in a single scale is appropriate. In regressions, factor scores are used for regulation legitimacy scale*;* they reflect individual nursing homes' placement on an underlying factor of administrators' perceived regulation legitimacy.

Frequency of communication with state and local officials can be an important control variable in examining the impact of regulation on performance. Based on the TAMU Survey, a variable frequency of communicating with government agencies was created. The survey asked respondents how frequently they interacted with the following people or organizations, listing, among other options, these three: (1) state regulatory agencies, (2) state and local public officials, (3) state Medicaid. For each of these options, respondents selected among the following: never (0); yearly (1); monthly (2); weekly (3); more than once a week (4); daily (5). Factor analysis supported using a single scale for these three items, and factor scores were used for the variable frequency of communicating with government agencies with the higher values reflecting more frequent interactions with state regulatory agencies, public officials, and the Medicaid program staff (Cronbach's alpha 0.51, eigenvalue 1.61). All factor loadings were greater than 0.59. Means were imputed for missing items, in about 5% of cases, before conducting factor analysis.)

All models include the lagged dependent variable – total number of health deficiencies *in 2011-2010* –for three reasons: (1) to avoid omitted variable bias, since present quality is likely

affected by past quality, (2) to keep past performance constant while assessing the effect of regulatory factors on performance, and (3) the correlation coefficient between current and the lagged performance measures is modest (0.34) and is unlikely to raise the issue of correlation between the error term and the lagged variable. (Excluding the lagged variable from regression models does not change our findings.)

To explore variation in impact across sectors, two nominal variables indicating a nursing home's legal ownership status were used: nonprofit nursing home and public nursing home (source: NHC). For-profit ownership was the omitted category. In addition, sub-group analysis is presented with separate results for public, nonprofit, and for-profit nursing homes.

Other Independent Variables

The analysis incorporates three management variables from the TAMU Survey. Variable sharing power reflects a nursing home administrator's propensity to involve organizational and external stakeholders in the decision-making process. A factor score using seven items listed in appendix B measures sharing power. The variable innovation measures a nursing home administrator's propensity to look for and adopt new ideas or practices, and to change with its environment. This variable incorporates factor scores generated based on four items from appendix B. The variable managing external influences reflects an administrator's strategies related to external influences. Four items in appendix B are combined in a factor score.

To account for organizational location and various environmental risks (Smith 2006), several other organizational and environmental factors are controlled for. Number of certified beds measures nursing home's size (source: NHC). Number of residents reflects the number of clients occupying beds in a nursing home which, upon controlling for the number of certified beds, reflects organizational occupancy (source: NHC). Total nursing hours per resident per day

measures staffing and reflects the total registered nurse, vocational nurse, and nurse aide hours per resident per day (source: NHC). Percent residents on Medicaid (from CMS) reflects the percentage of "impoverished" nursing home residents who were Medicaid program recipients (as opposed to Medicare, private long-term care insurance, or private-pay). Hospital affiliated home, a nominal variable, accounts for a facility's affiliation with a hospital, as opposed to being a freestanding nursing home (1=yes, 0=no) (source: NHC). Change of owner during past 12 months indicates whether a facility changed its owner within 12 month of the survey (yes=1, no=0) (source: NHC). While no information is available on when each facility was originally established, the analysis includes a proxy indicating years since certification (source: NHC). Nominal variable family or resident council indicates whether a nursing home has an advisory council led by residents, families, or both (source: NHC). To measure local market competition, this article follows Angelelli et al. (2003), Castle (2005), and Grabowski (2001) in using the Herfindahl Index of competition varying between zero and one. It is the sum of squared market shares (measured in #beds) for all Medicare and Medicaid certified homes in each county (source: NHC). Finally, three control variables describing the external environment were created from the AHRF data. Population density reflects population per square mile, and accounts for the urban/suburban/rural context. Percent in poverty reflects the percentage of county population below the poverty line. Finally, percent elderly reflects the percentage of county population older than 65.

Regressions

The general regression model is as follows:

$$Q_{2013\text{-}2012} = \beta_0 + \beta_1 RE_{2013\text{-}2012} + \beta_1 RL_{2013\text{-}2012} + \beta_3 FG_{2013\text{-}2012} + \beta_4 N_{2011\text{-}2010} + \beta_5 P_{2011\text{-}2010} + \beta_6 Q_{2011\text{-}2010} + \beta_7 X_{2011\text{-}2010} + e$$

where Q = care quality, RE = regulatory expertise, RL=regulation legitimacy, FG=frequency of communicating with government agencies, N=nonprofit ownership, F=public ownership, X = control variables.

The dependent variable in each model is the most recent survey record as of January 1 2014, i.e., surveys conducted in 2013 or late 2012. (Years 2013-2012 or 2011-2010 are used as subscripts, with the more recent years listed first, because Nursing Home Compare is an unbalanced data set, and inspections occur roughly within 9-15 months of a given file date. The 1/1/2014 Nursing Home Compare file used here included inspections conducted mostly in 2013, with a smaller share of homes having their most recent inspection in 2012. The pre-test wave used includes mostly surveys conducted in 2011, and for homes that were not inspected in 2011, the next most recent survey in 2010 was used). All control variables in both models pertain to the second latest inspection for these nursing homes conducted in 2011 (or 2010). Since the TAMU Survey was administered between 2012 and 2013, all regulation- and management-related independent variables pertain to the same time period as the dependent variables. Variables from the AHRF, percent elderly, percent in poverty, number of home health agencies and number of hospices pertained to the year 2011, while population density, number of hospitals and percent White pertained to 2010.

Results for two alternative models are reported. First, OLS with robust standard errors (to address heteroscedasticity) and state fixed effects is used. The latter helps alleviate the problem of interdependent observations at the state level that may produce inefficient estimates in OLS (Gujarati, 1995) and also controls for state-to-state variations in regulatory capacity and any state-level social and cultural factors that might influence regulatory compliance. Second, a Negative Binomial model with state fixed effects is used. The dependent variable – *total number*

of health deficiencies – is an all-positive count with a positively skewed (Poisson) distribution. In the second "archival" quality model focusing on the *overall 5-star rating,* the dependent variable is measured ordinally, and ordered logit with state fixed effects is used.

Findings

Table 1 provides summary statistics. An average facility has about six deficiencies and is assigned 3.7 stars. A typical nursing home has approximately 100 beds and 90 residents. On average, 60% of residents are reimbursed by the Medicaid program. The vast majority of homes are not hospital-affiliated. An average facility was certified 21 years ago and operates in a fairly concentrated market (Herfindahl Index of .29). Administrators, on average, have 14 years of nursing home administration experience. Some of the central variables of interest are shown along with the original survey questions used to create the scales. In the sample, 38% of respondents "strongly agreed" that they were very familiar with the regulatory standards (regulatory expertise variable). The mean of the original survey item is fairly high: 3.37 (1 to 4 scale). While regressions use factor scores for regulatory competence, frequency of communicating with government, sharing power, innovation, and managing external influences scales, Table 1 includes the more intuitively clear averages of survey items comprising those scales. Thus, average regulation legitimacy is 3.02, and the original items comprising it are 2.88 (deficiencies assigned by regulators are fair), 3.22 (nursing homes use standards internally), and 2.95 (inspectors did a good job).

Table 2 compares three key independent variables across public, nonprofit, and for-profit sectors. Regulatory expertise and regulation legitimacy are not significantly different across sectors. There are significant differences in terms of the frequency of contact with government agencies: public and for-profit sectors communicate more than nonprofit organizations do.

[Tables 1, 2, and 3 here]

Regression results based on the entire sample are presented in Table 3. Regulatory expertise is not associated with care quality. Meanwhile, regulation legitimacy has a significant negative effect on the number of health violations. It also has a significant positive effect on facilities' 5-star ratings. Inclusion of a lagged dependent variable ensures that this relationship is not the result of nursing home administrators' generalizing from their past performance: keeping past violations constant, higher perceived legitimacy of regulators and regulation is associated with stronger performance. Notably, in two of three models, the frequency of nursing homes' communicating with government agencies is significant: nursing homes that communicate more frequently tend to have more regulatory violations and lower star ratings. The remaining findings in this table largely support the existing literature on nursing home quality. Consistent with past research, public and nonprofit organizations have fewer deficiencies and higher star ratings than for-profit nursing homes. Past deficiencies are positively associated with current deficiencies, and negatively with the current star rating. Innovation management decreases health violations but not star ratings. Smaller facilities and those with higher occupancy also tend to have fewer deficiencies and higher star ratings. Meanwhile, the percentage of residents on Medicaid is negatively associated with both quality measures. Similarly, local poverty rate increases health deficiencies and decreases facility star ratings.

[Table 4 here]

To understand better how ownership moderates the effect of regulation on nursing home care quality, Table 4 shows analyses for public, nonprofit, and for-profit sub-groups. For space considerations, only odds ratios are shown for negative binomial models. Regulation legitimacy is associated with fewer health violations and higher star ratings among nonprofit and for-profit nursing homes. It is not statistically significant in the public-sector model, and the magnitude of this relationship is negligible. Additionally, nonprofit nursing homes with higher regulatory expertise have more health deficiencies and lower star ratings ($p<0.1$). Frequent communication with government agencies is negatively associated with the star ratings among for-profit homes only.

Discussion

Institutional long-term care is an increasingly salient policy area due to high costs and growth in users (Kane 1995). Seen as a viable alternative to self-regulation, hierarchical control, or market competition (James 2000), government regulation is used to monitor, control, and correct the behavior of nursing homes. To date, the relationship between regulation and organizational performance has been presumed but not well researched. This study investigates how expertise and perceptions of government regulation among public, nonprofit, and for-profit nursing homes influence performance.

Keeping past performance constant, perceived regulation legitimacy is associated with fewer health violations and higher star ratings. Administrators who report that federal inspectors do a good job, who consider past inspections fair, and who use federal standards internally to monitor care quality, also run better nursing homes. While the variables are based on perceptual data, these perceptions, at least in part, may reflect the reality of our respondents' experiences. Effective state inspectors generating a fair assessment of performance may ease managers'

concerns over inspections, help them understand the expectations, and reduce the punitive tone of government regulation. Effectively conducted inspections can also motivate organizations to collaborate, be transparent, and focus on compliance. Internal use of the standards enforced by the regulators implies that these standards are perceived as useful and meaningful. This can help reduce ritualistic behavior and turn federal standards into tools for improving excellence. Internal use of standards also suggests an internal commitment to monitor performance continuously, beyond the periods of inspection. This ongoing attention can help minimize deficiencies. Thus, this analysis provides support for the public-interest model of regulation, suggesting that effective regulation improves performance.

The findings necessitate additional research to further explore these arguments, however; and the sub-group analysis adds more nuances to this relationship. Regulation legitimacy is consistently associated with better performance among nonprofit and for-profit facilities, but no relationship is found among public facilities. Bivariate analysis in Table 2 suggests that government nursing homes are no different from for-profit and public nursing homes in terms of their regulatory expertise and legitimacy. Thus, the findings are unlikely attributable to the fact that public homes have higher expertise to begin with. Possibly public agencies are more committed to the cause of regulation, and their specific experiences with regulation are less relevant. Government nursing homes' operations may inherently be based on these standards, and their cooperation and perceptions may not matter as much as in the private sector. However, in private homes interactions with government agencies may be limited to state inspections, and compliance may be more directly influenced by the managers' experiences during these inspections.

The analysis also suggests that managers' expertise – knowledge of the 180 specific

requirements – does not influence performance in the larger sample. The lack of variation in our data might explain these findings. Mindful of the positivity bias, this binary variable was coded as 1 when respondents "strongly agreed" that they were familiar with the regulatory standards (38% of our sample), as opposed to those who "agreed" (43%) and "disagreed" or did not know the answer (18%, combined). While positivity bias cannot be ruled out, the distribution of this variable is unsurprising: complying with state regulations – understanding the standards and leading a nursing home though its annual inspection– is a central part of any nursing home administrator's work. With these high scores found among most respondents, those reporting high expertise do not perform better. Furthermore, in nonprofit facilities administrators with high regulatory expertise receive more deficiencies and lower star-ratings. Thus, managers who spend excessive amount of time on compliance may invest less time in organizational management which, in turn, undermines quality. While nonprofit homes have been empirically shown to provide the highest quality of care, excessive compliance burden may undermine these providers' ability to invest in cutting-edge practices and technologies.

Across models, there is limited evidence that communication with government agencies is negatively associated with organizational performance. Sub-group analysis suggests that this relationship is significant among for-profit homes. These contacts may be initiated by government agencies reaching out to the providers in response to client complaints or other concerns. Alternatively, nursing homes may be internally detecting performance problems (such as staffing concerns, structural deficiencies, or client health concerns) and contacting the regulatory and government agencies to clarify the expectations. While possibly helping to identify or investigate concerns, these contacts fail to mitigate and resolve regulated entities' performance problems. These findings are especially interesting since frequency of external

contacts with government agencies has been used as a proxy for extent of government regulation (Boyne 2003). The negative relationship for communication might also suggest that regulators and government agencies are engaged in greater monitoring of problematic nursing homes. Past research has shown similar negative relationships for poorly performing Texas school districts (O'Toole and Meier 2011) and for poorly performing English local governments (Walker et al. 2010).

Conclusion

This study has implications for policy makers and practitioners. The literature on regulation suggests that solutions to regulatory problems lie in strengthening alternatives to regulation (such as self-regulation or market competition) or improving regulation itself (James 2000; Nyman and Geier, 1989). Historically, in the context of nursing home care providers' self-regulation or competition proved to be insufficient. Improving the regulatory process – modernizing it, improving its consistency, coordination, and quality – has been argued to be necessary (Hood et al. 2000). Our study suggests several directions for these changes. First, the fairness and effectiveness of regulatory experience appears to matter for performance. Thus, investing in inspectors' training, to help insure a quick, fair, transparent, and consistent inspection process, can improve the providers' perceptions of the quality assessment process and their commitment to reducing health deficiencies. Additionally, since regulation legitimacy incorporates internal utility of federal standards, assisting the providers in establishing internal performance monitoring systems mirroring federal guidelines may help ensure more ongoing quality. Second, government agencies should recognize that communication with providers may be used as a tool to not only monitor but also correct their performance. They should consider incorporating strategies that investigate and also help promptly mitigate identified problems.

Third, administrators of regulated nursing homes should be mindful that excessive commitment to external expectations should not undermine their ability to manage staff, promote innovations, resolve internal problems, and prevent deficiencies from happening.

The findings of this study contribute to public administration research on government regulation and its effect on performance. However, the findings in the context of nursing home care should be generalized with caution to other policy fields. Policy transparency and its effects on decision-making legitimacy often vary across policy fields (de Fine Licht 2014). Nursing home care is a unique "high touch and low tech" market where regulatory pressures do not necessarily align well with market pressures (e.g., nursing home clients are often unable to "vote with their feet") and where providers' compassion and dedication are incredibly hard to measure (Kane, 1995; Walshe 2001). While limiting the external generalizability of the findings, these considerations underscore the value of effective regulation in similar policy fields such as home health care, mental health, substance abuse, or child care.

Several additional limitations should be noted. While the hybrid data allow one to avoid common source bias by combining information on externally administered performance indicators with internal managerial strategies and perceptions (often unknown to outside stakeholders), perceptual data are still subject to positivity bias. Thus, as noted earlier, administrators can over-report their knowledge of regulatory standards. Note, however, that Medicare and Medicaid certification is of paramount importance to facilities that admit those patients, and doing well on state surveys has been found to be prioritized by nursing home administrators (Deutschman 2005). Thus, while possibly overestimating their expertise, most nursing home administrators are acutely aware of federal regulations. Similarly, views of

regulation legitimacy may suffer from social desirability bias. This concern is somewhat minimized by the online/mail-in nature of the TAMU Survey.

While this analysis includes an extensive set of controls beyond what is typically accounted for in nursing care policy research, omitted variable bias is always a risk. Specifically, measures of costs are lacking in our data (percentage of Medicaid residents can only serve as an indirect measure of facility's resources). Additionally, as noted earlier, the sample is slightly more likely to include better performing facilities, and hence the effect of regulation legitimacy observed here may be more pronounced in those homes.

As a final note, three directions for the future research can be pointed out. As a follow-up to this article, it is important to investigate how market competition moderates the effect of regulatory compliance on nursing home performance, possibly by reducing the need for providers' cooperation in the regulatory process. The second direction is to analyze more fully the variation in regulatory expertise and legitimacy across public, nonprofit, and for-profit sectors. Understanding these differences will help inform and develop more targeted solutions to regulatory failures. Finally, extending this research to other service areas and accounting for the broader range of factors related to regulators, regulated entities, regulatory instruments, and their context will help analysts understand the topic more comprehensively.

Table 1. Summary statistics.

Variables	Mean	St. D.	Obs
DEPENDENT VARIABLES: Nursing Home Quality			
Total number of health deficiencies (2013-12)	5.87	5.04	713
Overall 5-star rating (2013-12)	3.65	1.24	682
INDEPENDENT VARIABLES			
Regulatory Expertise (% "strongly agree")	0.38	n/a	715
Original Syrvey Item: Very familiar with standards*	3.37	0.57	715
Regulation Legitimacy (avg/3 items)	3.02	0.58	715
Original Syrvey Item: Deficiencies assigned are fair*	2.88	0.78	715
Original Syrvey Item: We use gov standards internally*	3.22	0.61	715
Original Syrvey Item: Inspectors did a good job*	2.95	0.75	715
Freq of communicating with government (avg/3 items)	1.49	0.60	715
Original Syrvey Item: How frequently do you interact with State Medicaid**	1.52	1.04	715
Original Syrvey Item: How frequently do you interact with State Medicaid state and local public officials**	1.57	0.82	715
Original Syrvey Item: How frequently do you interact with tate regulatory agencies**	1.37	0.59	715
Other independent variables			
Management: Sharing power (avg/7 items)	3.29	0.32	715
Management: Innovation (avg/4 items)	2.81	0.51	715
Management: Managing ext. influences (avg/4 items)	3.00	0.42	715
Years as a Nursing Home Administrator	13.86	10.2	715
Total number of health deficiencies (2011-10)	6.18	5.20	680
Nonprofit nursing home (proportion "yes")	0.35	n/a	715
Public nursing home (proportion "yes")	0.34	n/a	715
Number of certified beds	103.48	72.4	706
Number of residents	89.03	67.2	706
Total nursing hours per resident per day	4.17	1.81	706
Percent residents on Medicaid	58.05	22.3	706
Hospital affiliated home (proportion "yes")	0.11	n/a	706
Change of owner during past 12 month	0.03	0.16	706
Years since certification	21.34	11.9	706
Family or resident council (proportion "yes")	0.97	n/a	715
Population density (in 1000 persons per sq. mile)	0.77	2.6	714
Percent elderly	15.32	4.1	714
Percent in poverty	15.59	5.3	714
Herfindahl index of competition	0.29	0.29	708

* We asked: “To what extent do you agree or disagree with the following statements?”

Response categories are as follows: strongly agree (4), agree (3), disagree (2) and strongly

disagree (1). ** Responses: never (0); yearly (1); quarterly (1.5); monthly (2); weekly (3); more than once a week (4); daily (5).

Note. We should averages for regulation legitimacy, frequency of communicating with government, sharing power, innovation, and managing external influences scales. In regressions, individual factor scores are calculated and used.

Table 2. Regulation variables across three sectors.

Variables	Public	Nonprofit	Forprofit	sig.
Regulatory Expertise (proportion "yes")	0.38	0.40	0.37	
Regulation Legitimacy (avg/3 items)	3.05	3.03	2.96	
Freq of communicating with gov-t (avg/3 items)	1.53	1.36	1.57	***
Note 1: Chi-square square test results are shown under "sig" for the first variable.				
Anova test results are shown under "sig" for the first two variables.				
Note 2: ***=sig <0.01; **=sig <0.05; * sig <0.1.				

Table 3. Regression results for total number of health deficiencies and overall 5-star ratings.

Independent Variables	NURSING HOME QUALITY									
	Total number of health deficiencies							5-star rating		
	Fixed Effects			Negative Binomial				Ordered Logit		
	b	S.E.	sig	b	OR	S.E.	sig	b	S.E.	sig
Regulatory Expertise (yes/no)	0.22	0.32		0.05	1.05	0.07		-0.21	0.16	
Regulation Legitimacy (FS)	-0.65	0.15	***	-0.14	0.87	0.03	***	0.24	0.08	***
Freq of comm w/t gov-t (FS)	0.15	0.14		0.05	1.05	0.03	*	-0.20	0.08	**
Management: Sharing power (FS)	0.24	0.16		0.04	1.04	0.04		0.02	0.09	
Management: Innovation (FS)	-0.57	0.18	***	-0.09	0.91	0.03	***	0.11	0.08	
Management: Ext. influences (FS)	-0.39	0.26		-0.05	0.95	0.03		0.09	0.08	
Years as a Nursing Home Administrator	-0.02	0.01		0.00	1.00	0.00		0.01	0.01	
Nonprofit nursing home	-1.18	0.48	**	-0.22	0.80	0.08	***	0.71	0.20	***
Public nursing home	-1.55	0.54	***	-0.24	0.79	0.09	***	0.74	0.20	***
Total number of health deficiencies (pretest)	0.23	0.02	***	0.04	1.04	0.01	***	-0.16	0.02	***
Number of certified beds	0.03	0.01	**	0.00	1.00	0.00	**	-0.02	0.00	***
Number of residents	-0.02	0.01	*	0.00	1.00	0.00		0.01	0.01	***
Total nursing hours per resident per day	0.17	0.10		0.03	1.03	0.02		0.04	0.06	
Percent residents on Medicaid	0.02	0.01	*	0.00	1.00	0.00		-0.01	0.00	***
Hospital affiliated home	0.43	0.73		0.12	1.13	0.11		-0.30	0.26	
Change of owner during past 12 month	-0.95	0.84		-0.08	0.93	0.20		0.29	0.45	
Years since certification	0.00	0.02		0.00	1.00	0.00		0.01	0.01	
Family or resident council	1.10	0.93		0.35	1.42	0.20	*	-0.10	0.53	
Population density	-0.10	0.06		-0.01	0.99	0.01		0.10	0.04	***
Percent elderly	-0.01	0.05		0.00	1.00	0.01		0.01	0.02	
Percent in poverty	0.07	0.05		0.01	1.01	0.01	**	-0.04	0.02	***
Herdindahl index of competition	0.60	0.71		0.07	1.08	0.14		-0.03	0.31	
Intercept	0.58	1.32								
N	678			678				654		
R Square (or Pseudo R Square)	0.17			0.07				0.13		
Prob > F (or Chi Square)	0.00			0.00				0.00		
Note: ***=sig <0.01; **=sig <0.05; * sig <0.1										

Table 4. Regression results by sector.

	NONPROFIT SAMPLE						FORPROFIT SAMPLE						PUBLIC SAMPLE					
	Health Deficiencies			Overall 5-star rating			Health Deficiencies			Overall 5-star rating			Health Deficiencies			Overall 5-star rating		
Independent Variables	Negative Binomial Model			Ordered Logit			Negative Binomial Model			Ordered Logit			Negative Binomial Model			Ordered Logit		
	OR	S.E.	sig	b	S.E.	sig	OR	S.E.	sig	b	S.E.	sig	OR	S.E.	sig	b	S.E.	sig
Regulatory Expertise (yes/no)	1.29	0.12	*	-0.48	0.29	*	0.86	0.11		-0.32	0.31		1.00	0.12		0.16	0.31	
Regulation Legitimacy (FS)	0.76	0.06	**	0.37	0.14	***	0.86	0.05	***	0.48	0.15	***	0.92	0.06		0.04	0.14	
Freq of communicating with gov-t (FS)	1.06	0.06		-0.04	0.14		1.03	0.05		-0.42	0.14	***	1.10	0.06		-0.18	0.14	
Management: Sharing power (FS)	1.04	0.07		-0.19	0.16		1.01	0.06		0.11	0.15		0.97	0.07		0.09	0.16	
Management: Innovation (FS)	0.91	0.06		0.14	0.14		0.99	0.06		0.07	0.15		0.84	0.06	***	0.18	0.14	
Management: Ext. influences (FS)	0.99	0.06		0.09	0.14		0.91	0.06	*	0.32	0.16	**	0.98	0.06		-0.08	0.14	
Years as a Nursing Home Administrator	0.99	0.01		0.00	0.01		1.00	0.01		0.00	0.02		1.00	0.01		0.02	0.01	
Total number of health deficiencies (11-10	1.07	0.01	**	-0.22	0.03	***	1.04	0.01	***	-0.12	0.03	***	1.05	0.01	***	-0.16	0.03	***
Number of certified beds	1.01	0.00	*	-0.02	0.01		1.01	0.00	*	-0.02	0.01	**	1.00	0.00		-0.02	0.01	***
Number of residents	0.99	0.00	*	0.01	0.01		0.99	0.00		0.02	0.01	**	1.00	0.00		0.02	0.01	**
Total nursing hours per resident per day	0.98	0.06		0.04	0.13		0.93	0.04		0.53	0.18	***	1.07	0.03	***	-0.09	0.06	
Percent residents on Medicaid	1.00	0.00		-0.01	0.01		1.00	0.00		-0.03	0.01	***	1.00	0.00		0.00	0.01	
Hospital affiliated home	1.17	0.18		-0.70	0.44		1.10	0.59		-1.71	1.69		0.97	0.15		0.01	0.36	
Change of owner during past 12 month	1.06	0.37		0.75	0.93		0.88	0.26		0.88	0.62		1.31	0.48		-1.74	1.18	
Years since certification	1.01	0.01		0.00	0.01		1.00	0.00		0.02	0.01		1.00	0.00		0.01	0.01	
Family or resident council	1.44	0.38		0.09	0.93		1.22	0.34		0.32	1.01		2.26	0.42	*	-1.00	1.05	
Population density	0.96	0.03		0.06	0.06		0.96	0.03		0.06	0.07		0.99	0.03		0.79	0.36	**
Percent elderly	0.98	0.02		0.00	0.04		1.04	0.02	**	0.00	0.04		1.00	0.01		0.02	0.03	
Percent in poverty	1.01	0.01		-0.07	0.03	**	1.01	0.01		0.00	0.03		1.00	0.01		-0.05	0.03	**
Herdindahl index of competition	0.98	0.25		0.40	0.65		0.39	0.26	***	1.08	0.69		1.49	0.18	**	-0.55	0.48	
Intercept	2.52	0.58					2.27	0.54					1.14	0.61				
N	237			227			209			201			232			226		
R Square (or Pseudo R Square)	0.06			0.15			0.05			0.16			0.03			0.12		
Prob > F (or Chi Square)	0.00			0.00			0.00			0.00			0.00			0.00		
Note: ***=sig <0.01; **=sig <0.05; * sig <0.1																		

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Appendix A.

Comparison of all operating US nursing homes (n=15,474) to our sample (N=715).

Population (2013-2012 wave)		**Our Sample (2013-2012 wave)**	
Ownership	Percent residents on Medicaid		Ownership
Forprofit	63.23	62.44	Forprofit
Nonprofit	49.03	50.34	Nonprofit
Public	62.10	61.96	Public
	Number of certified beds		
Forprofit	109.56	110.52	Forprofit
Nonprofit	94.25	94.67	Nonprofit
Public	114.96	105.39	Public
	Number of residents		
Forprofit	89.17	91.50	Forprofit
Nonprofit	81.17	83.21	Nonprofit
Public	94.98	90.01	Public
	Total nurse hourse per resident per day		
Forprofit	3.93	3.95	Forprofit
Nonprofit	4.53	4.37	Nonprofit
Public	4.49	4.49	Public
	Hospital affiliation		
Forprofit	0.011	0.009	Forprofit
Nonprofit	0.145	0.124	Nonprofit
Public	0.262	0.196	Public
	Number of health deficiencies		
Forprofit	7.49	6.74	Forprofit
Nonprofit	5.36	5.03	Nonprofit
Public	6.44	6.01	Public
	5-star rating		
Forprofit	3.19	3.19	Forprofit
Nonprofit	3.79	3.97	Nonprofit
Public	3.58	3.73	Public

Appendix B. Measures of Organizational Management

Sharing power scale

To what extent do you agree or disagree with the following statements? (Response categories are as follows: strongly agree (4), agree (3), disagree (2) and strongly disagree (1)).

1. I often reconcile disagreements within our nursing home.
2. I involve nursing and other non-managerial staff in my nursing home's decision-making process.
3. Residents' and families' feedback and outcomes are taken into consideration when revising policies.
4. Non-manager feedback is taken into consideration when revising policies.
5. The information I receive from others regarding operations and performance matches my own perceptions.
6. I give my senior staff a great deal of discretion in making decisions.
7. The opinion of the local governing board of this nursing home is always considered in executive decisions.

Innovation scale

To what extent do you agree or disagree with the following statements? (Response categories are as follows: strongly agree (4), agree (3), disagree (2) and strongly disagree (1)).

1. Our nursing home is always among the first to adopt new technology and practices.
2. We continually search for new opportunities to provide services to our community.
3. Our nursing home is always among the first to adopt new ideas and practices.

4. Our nursing home frequently undergoes change.

Managing external influences scale

To what extent do you agree or disagree with the following statements? (Response categories are as follows: strongly agree (4), agree (3), disagree (2) and strongly disagree (1)).

1. My role is to respond to various events and disturbances in the external environment of our nursing home.
2. I always try to limit the influence of external events on the staff and nurses.
3. I strive to control those factors outside the nursing home that could have an effect on my organization.
4. Our nursing home emphasizes the importance of learning from the experience of others.

Factor analysis information

Factor analysis of these scales suggested a single underlying factor in each, as well as Cronbach's alpha of 0.6 and higher. To maximize our sample size, we imputed the mean for the missing values of all items comprising these three management scales. For three quarters of all items, less than 5% of the sample had missing values, and for the remaining one quarter of all items, between 5 and 12% of the sample had missing values.