

COMPARING SERVICE AND QUALITY AMONG CHAIN AND INDEPENDENT NURSING HOMES DURING THE 1990s¹

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ABSTRACT (99 WORDS)

We examine growth of chain-ownership of United States nursing homes during the 1990s and compares chain-owned to independent nursing homes in terms of service provision, staffing intensity, payer and case mix, and residents' health outcomes. Analyses move beyond the commonly used dichotomy of independent vs. chain to also compare facilities across the structural dimensions of facility size, chain size, and profit status. These dimensions are often more useful than chain ownership for explaining differences in resource levels, service mix, resident populations and classic quality outcomes across facilities. Our findings suggest that chain ownership is not incompatible with high-quality care.

COMPARING SERVICE AND QUALITY AMONG CHAIN AND INDEPENDENT NURSING HOMES DURING THE 1990s

The growth in for-profit chain ownership of nursing homes in the United States (U.S.) has generated concerns over reductions in the quality of care that might occur as a result of meeting strategic imperatives for standardization and shareholder demands for corporate profits. These concerns have escalated over the past decade as corporate chains have come to dominate the U.S. nursing home industry and health service sectors more generally.

Research, however, provides mixed evidence for the impact of chain ownership on health services and quality (Cohen and Dubay 1990; Harrington et al. 2001; Lee, Birnbaum, & Bishop 1983) and for the extent of efficiencies realized within nursing home chains (McKay 1991; Holmes 1996). To some degree, this lack of conclusiveness may relate to a general failure to consider structural dimensions beyond the familiar chain vs. independent dichotomy (Baum 1999). In order to resolve this ambiguity, we examined whether, *in addition* to membership in a chain, organizational size and profit status revealed differences in payer mix, case mix, and a few “classic” quality indicators for nursing homes, including staffing intensity, availability of specialty services, restraint use, and pressure ulcer (PU) prevalence.

Our paper begins with a short outline of the key structural dimensions we considered and a description of our data and methods. We then briefly examine trends in chain ownership between 1991 and 1996, and discuss descriptive statistics for the

1996 data in light of the significant relationships we observed between structural dimensions and quality indicators.¹

KEY STRUCTURAL DIMENSIONS

Chain membership, organizational size (chain and facility), and profit status reflect fundamental differences in nursing homes' missions and operations. These structural dimensions influence the ways in which organizations secure capital and pursue growth, as well as their motivation and capacity to address residents' needs and health issues.

Chain membership identifies a nursing home as part of a multi-unit organization comprising facilities that share the same structure and outputs (Greve and Baum 2001). Standardization in order to maximize operational efficiencies is a strategic imperative of chains. For-profit chains, particularly, are suspected of downgrading quality in the name of efficiency in order to meet shareholder demands. *Organizational size* affects an organization's competitive advantage, its ability to acquire resources, and its operating and strategic capabilities (Baum 1996; McKelvey 1982). We examined both the impact of chain size (the number of facilities a chain operated) and facility size (the number of beds in a nursing home). *Profit status* governs a nursing home's mission (Robinson 2001) and shapes its incentive systems. In theory, nonprofit operators apply their revenues to performance-improvement initiatives and to providing less profitable services and charity care. In contrast, for-profits are depicted as reluctant to invest revenues in service and facility improvements (Lemke and Moos 1989; O'Neill et al. 2003; Rosko et al. 1995; Weisbrod and Schlesinger 1997).

DATA AND METHODS

Our study drew on data from the *On-line Survey Certification and Reporting System* (OSCAR) from 1991 to 1996. OSCAR collects annual state inspection data on all federally certified nursing homes in the continental U.S. (excluding Washington, DC).² When developing our database, we limited chains to corporations that owned at least two facilities in any given calendar year and excluded “single home holding companies” because they appeared to be either stand-alone corporate entities or large health-provider systems that included nursing homes along with other facilities (e.g., hospitals or health systems).³

For each of the key structural dimensions we compared facilities across several characteristics that included resource level and service mix, resident characteristics, and a few “classic” quality indicators. Resource level was measured as clinical staffing intensity, by the number of clinical staff per bed (including registered nurses, licensed practical nurses, nursing aides, and therapy staff) and specialty service mix referred to the capacity to provide services (per bed) relative to the total number of beds in a facility. Three types of specialty care beds were included: those for residents with Alzheimer’s disease, rehabilitative needs, and using miscellaneous medical services. In addition, we measure the availability of two types of specialty services – injection and therapy (therapy could include speech, occupational, or physical therapy) – again per bed.

Payer mix was also compared across facilities and included specifically the percentage of residents covered by Medicaid or private payment; in this case, private

payment could include insurance other than Medicare or Medicaid. Case-mix factors included the percentage of residents incontinent, receiving anti-psychotic drugs, and bedfast. Consistent with prior research (Aaronson et al. 1994; Harrington et al. 2001; Marlin et al. 1999; Mukamel 1997), we also compared facilities on quality indicators that include the number of health deficiencies cited on state inspections, and as resident-specific outcomes, the percentage of residents with pressure ulcers (PUs) and that were restrained.⁴ The statistical significance of differences across ownership and size categories was determined using an ANOVA F-test.

RESULTS

The Changing Composition of the U.S. Nursing Home Industry 1991-1996

Exhibit 1 reports the number of nursing home facilities and chains from January 1991 through September 1997. In total, there were about 104,000 records in the longitudinal data set, covering over 19,000 nursing homes. There was a slight growth in the total number of nursing homes across the country, from 15,682 in 1992 (the first full year of data) to 17,755 in 1996 (approximately 13% change). We identified 2,255 nursing home chains operating during this same period with substantially more change, both new appearances and discontinuation in operations, than observed at the facility level. In 1992, 725 corporate organizations were reported as operating nursing home facilities and overall, this increased to 928 in 1996, which overall reflects a 28% increase in the number of chains with much of the growth in small and mid-sized chains.

[Exhibit 1 about here.]

Most multi-home chains were quite small---roughly 87% operated 10 or fewer homes. While chaining of nursing homes was primarily on a small scale, it was also widespread. Exhibit 2 shows changes in percentage that were chain owned by state. “G” distinguishes states where the increase in the percent of homes that were chain owned was greater than increases in the number of nursing homes that were non-chains while “L” indicates states where change in the percent of homes that were chain owned were smaller than increases in the number of independent facilities in that state. We observed growth in the percentage of homes that were chain owned across 80% of the states, and for the nation, the percentage of nursing homes that were chain-owned increased from 39% to 43%. Increases in the percent chain-owned exceeded growth in the number of independent facilities in 30 states, and in most of those states, increases in the percent chain-owned exceeded 20%.

[Exhibit 2 about here.]

Staffing Intensity and Specialty Service Availability

Exhibit 3 compares clinical staffing intensity and specialty service availability across the structural dimensions of proprietary and chain ownership and facility and chain size. Across proprietary and chain ownership categories, staffing intensity declined with a facility's size. In addition, nonprofits (both chain owned and independent) had higher staffing intensity than for-profits and chain-owned nonprofits had lower staffing intensity than independent nonprofits. On the other hand, staffing intensity was relatively equal across chain and independent for-profits (differences across chain ownership are not significant). When comparing chains of various sizes, we found that the largest nonprofit chains (i.e., those with the most homes) had the

lowest staffing intensity, although the statistical significance of this difference was marginal.

[Exhibit 3 about here.]

When comparing specialty care, smaller and chain-owned nursing homes, particularly for-profit chains, were slightly more likely to provide rehabilitation beds. On the other hand, smaller facilities had fewer beds for residents with Alzheimer's disease while chain-owned facilities, especially nonprofits, had more beds for residents with Alzheimer's. Smaller homes also provided slightly more beds for miscellaneous medical services as did nonprofit nursing homes. Beds with miscellaneous medical services were most abundant in independent nonprofit homes. The smaller facilities also provided a higher percentage of residents with injection and therapy specialty services, while nonprofit homes provided therapy specialty services to the greatest percentage of residents. For the most part, the size of a chain to which a facility belonged did not affect the provision of specialty care services (with the exception of the provision of therapy services).

Exhibit 4 provides descriptive comparisons of the payer and case mix for the resident population within homes and of quality indicators. Exhibit 4 reveals a marked segmentation in the industry: large for-profit nursing homes, including chain-owned and independent facilities, were most likely to serve Medicaid residents. The highest proportions of private-pay residents were served by nonprofit nursing facilities. This finding is consistent with previous observations that residents with private financial resources prefer nonprofit facilities (Hirth 1999). Our data also revealed that the percentage of residents covered by Medicaid tended to fall slightly with for-profit chain

size. This pattern could indicate a strategy on the part of large national chains to minimize their low-profit Medicaid populations, possibly because their managerial and marketing sophistication makes them better able than smaller chains to target more profitable residents.

[Exhibit 4 here.]

The time available for direct caregiving is strongly influenced by a facility's resident case mix and facilities may work strategically to achieve a particular case mix configuration. Our data indicates that case mix varies by both ownership and facility size. The percent of residents incontinent and receiving antipsychotics was slightly lower in the smallest facilities⁵ (where staffing ratios were higher) and in nonprofit facilities. However, both the percent incontinent and receiving antipsychotics were slightly higher in independent as compared to chain-owned facilities. The percentage of residents bedfast was slightly higher among chain-owned for-profits. Finally, the percent of residents who were bedfast was also highest in the smallest facilities (which also provide the most specialty services). Interestingly, for-profit chains were as likely as other facilities— or even somewhat more likely – to provide care to the most difficult-to-serve residents.

We also found only small differences in restraint use across profit and ownership categories, while restraint use increased markedly with facility size, regardless of type of ownership. On the other hand, there were some notable differences across facility types in the percentage of residents experiencing PUs. Chain-owned for-profits had the highest rates of PUs, while the lowest prevalence of PUs was among independent for-profits (which, on average, reported 6.8% of residents had PUs). Second, PUs were

more prevalent in the smallest facilities, with the sole exception of independent for-profits, where PUs were uniformly moderate. This finding was consistent with our observation that the smallest facilities had the highest proportion of bedfast residents.

Striking differences arose when we compared the state-weighted health deficiency frequency. Deficiencies were highest for independent for-profits, followed by chain-owned for-profits. We also observed contravening effects for size: *larger facility size* led to more deficiencies, while *greater chain size* decreased the number of deficiencies.

The OSCAR data allowed us to make several concluding observations regarding quality of care. First, facility comparisons on quality indicators (e.g., for restraint use, PU prevalence, and deficiency citations) showed that differences by size were much larger than differences by profit status or ownership category. Second, for-profit status does not have consistent effects across the three quality indicators, although independent for-profit facilities had the lowest quality in terms of both health deficiencies and percent of residents restrained (evidence is less clear for pressure ulcers). This pattern might have arisen from a combination of strong financial pressure and limited availability of professional management.

CONCLUSIONS AND POLICY IMPLICATIONS

Our principal observation is that chain ownership is not incompatible with high-quality care; in fact, chain membership on its own offers little discriminating value. Chain-owned facilities had a lower staffing intensity than independents, a finding that was paralleled by differences between for-profit and nonprofit facilities. Among the for-

profit chain homes, lower staffing intensity undoubtedly arose, in part, from the profit motive. However, the fact that nonprofit chains also had a somewhat lower staffing intensity suggests that central coordination may help chain-owned facilities operate more efficiently than their independent counterparts.

Service provision differed predominantly by facility size. A greater proportion of rehabilitation beds were located in small facilities, as were the vast majority of ancillary services. Of these services, a higher proportion of residents received therapy and injection services in small chain-owned nursing homes than in small independent facilities. Also, it should be noted that the highest proportion of residents with Medicare resided in small chain-owned facilities. This result might have stemmed from a combination of economies of scale across facilities and the availability of professional management to coordinate services. Certainly, the Medicare reimbursement guidelines applicable to this period (OBRA-87) led to an expanded provision of therapy services in nursing homes.

Cutbacks in Medicare implemented under the Balanced Budget Act of 1997 (BBA-97) have since led to financial difficulties in the nursing home sector. The most widely publicized troubles have been bankruptcies among some of the largest publicly traded nursing home chains, financial crises that have been attributed to over-leveraging and/or dependence on high-reimbursement ancillary services (Scully 2002). However, our analysis suggests that small independent facilities as well as nonprofit chains operating small facilities would also have been hit hard by the withdrawal of reimbursements for ancillary services. However, the effects on small independent facilities may be less noticeable than the prominent bankruptcies of national chains;

these smaller facilities may be acquired before failure or may choose exit from federal programs.

For-profit nursing homes had the highest proportion of Medicaid patients, despite the fact that this was the lowest margin segment of the market. Meanwhile, nonprofits had the highest share of higher-margin, private-pay residents and higher proportions of residents receiving Medicare. Previous research has already demonstrated resident preferences for nonprofit facilities (Hirth 1999). Our research confirms that, during the period under scrutiny, for-profit enterprises were not cream-skimming the high-margin resident market. We did not see evidence of Medicare-optimizing strategies among either the for-profits or the chains. In fact, chains looked very much like independent facilities in terms of their overall payer mix, again allaying concerns that chains disproportionately attract particular classes of residents.

While our observations would not lead us to predict differential effects of the BBA-97 on facilities in terms of their profit or ownership status, we would expect to observe differences across facility-size categories. To the extent that chain-owned facilities might have corporate resources to use during hard times, we believe small independent facilities will be more vulnerable overall to changes in Medicare reimbursements than small chain-owned homes.

This last set of propositions is particularly concerning because our results show that, independent of the structural dimensions of chain ownership or profit status, small nursing home facilities tended to be the best places for long-term care residents. Small facilities had the highest staffing ratios, the highest proportion of specialty services, the lowest restraint usage, and the lowest health deficiency frequencies. The superiority of

smaller facilities tended to hold whether a home was independent or part of a chain, for-profit or nonprofit. The strongest single indicator of care quality, therefore, was a staff's ability to provide personal care to residents; smaller facilities were better able to offer this. Unfortunately, smaller nursing homes may also be those most vulnerable to the vagaries of funding changes, especially facilities that do not have the benefits of professional management and slack resources available by virtue of chain ownership.

Exhibit 2. Change in the Percent of Nursing Homes that are Chain-Owned, 1992—1996

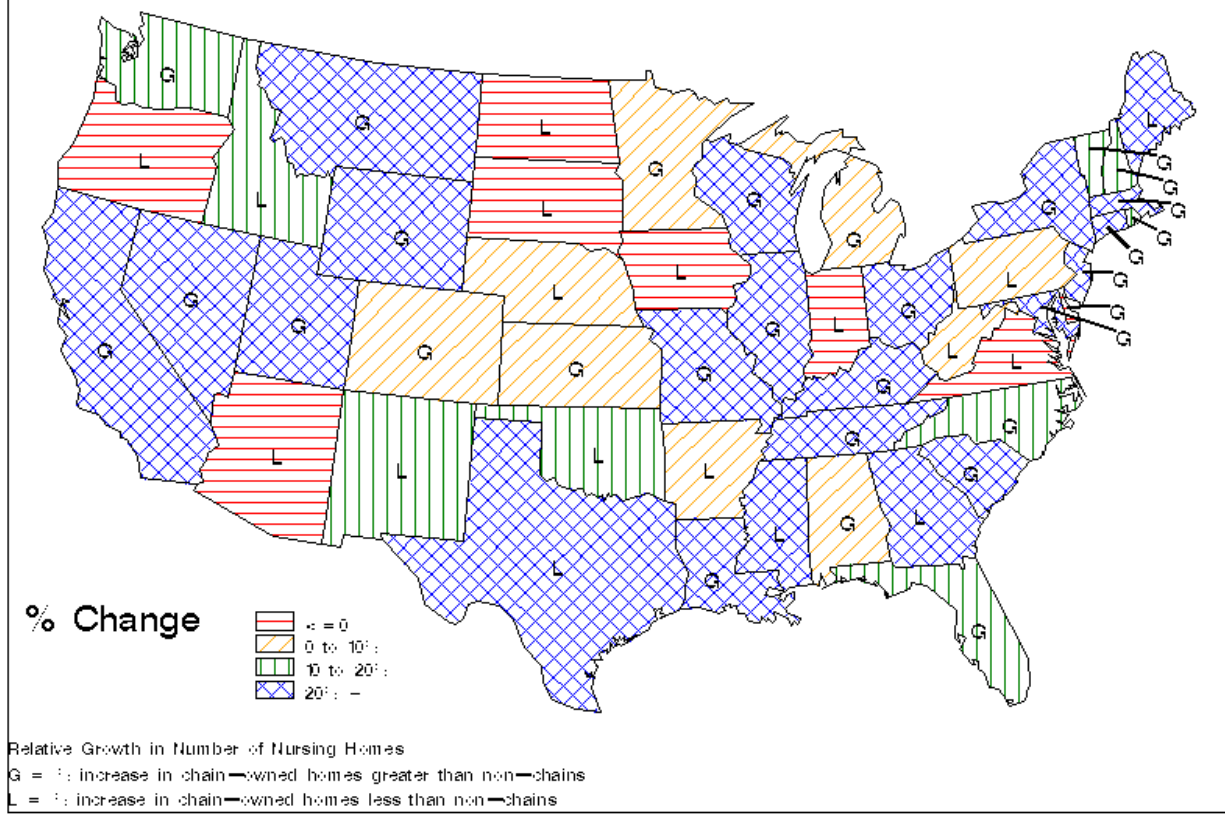


Exhibit 3. Descriptive Comparisons of Staffing and Specialty Service Availability, 1996 (N=17,459)*

		Cases	Staffing Intensity	Availability of Specialty Services				
			Clinical staff/ resident	% Rehab. beds	% Alz. beds	% Misc. Special beds	% receiving injection	% receiving therapy
Independent								
Nonprofit	3-50 beds	1,275	1.69	1.7%	0.5%	2.2%	16%	45%
	51-100 beds	1,439	1.05	0.4%	2.2%	1.0%	9%	16%
	101+ beds	1,702	0.92	0.9%	5.5%	1.2%	9%	15%
TOTAL		4,416	1.18	1.0%	3.0%	1.5%	11%	24%
For-profit	3-50 beds	878	1.11	1.1%	0.8%	1.1%	10%	14%
	51-100 beds	2,300	0.89	0.7%	1.7%	0.6%	9%	12%
	101+ beds	2,382	0.78	0.9%	3.4%	0.9%	10%	13%
TOTAL		5,560	0.87	0.8%	2.3%	0.8%	10%	13%
Chain								
Nonprofit	3-50 beds	288	1.61	1.1%	0.8%	0.6%	17%	53%
	51-100 beds	435	0.93	0.4%	2.6%	0.8%	9%	14%
	101+ beds	468	0.86	1.0%	6.1%	1.5%	9%	13%
TOTAL		1,191	1.07	0.8%	3.5%	1.0%	11%	23%
For-profit	3-50 beds	689	1.40	2.4%	1.3%	1.8%	15%	38%
	51-100 beds	2,389	0.85	1.0%	2.8%	0.7%	10%	15%
	101+ beds	3,214	0.79	1.5%	4.1%	1.0%	11%	16%
TOTAL		6,292	0.88	1.4%	3.3%	1.0%	11%	18%
ANOVA F-Test*			b,c	a,c	a,c	b,c	a,b,c	a,b,c
CHAINS ONLY								
Nonprofit	2-10 homes	808	1.17	1.0%	3.5%	1.2%	11.5%	25.9%
	11-50 homes	190	0.97	0.8%	2.7%	0.2%	11.3%	22.9%
	51+ homes	193	0.74	0.0%	4.3%	0.9%	8.8%	11.6%
TOTAL		1,192	1.07	0.8%	3.5%	1.0%	11.0%	23.0%
For-profit	2-10 homes	1,982	0.85	1.0%	3.3%	1.0%	10.3%	13.9%
	11-50 homes	1,529	0.92	1.4%	2.6%	0.8%	10.8%	17.5%
	51+ homes	2,781	0.87	1.7%	3.7%	1.1%	11.3%	20.7%
TOTAL		6,292	0.88	1.4%	3.3%	1.0%	11.0%	18.0%
ANOVA F-Test*			b		d			b,d

* For Test of differences across categories, we use an F-test in an ANOVA. Statistical significance at p<.01 denoted for a=chain ownership, b=proprietary ownership, c=facility size, d=chain size.

Exhibit 4. Descriptive Comparisons of Resident Population and Quality of Care Indicators, 1996 (N=17,459)

		Cases	Payer Mix		Case Mix			Quality Indicators		No. of Hlth Defic.
			% res Medicaid	% res private pay	% res incontinent	% res antipsychotics	% res bedfast	% res restrained	% res w/ PU	
Independent										
Nonprofit	3-50 beds	1,275	32%	24%	38%	38%	11%	12%	9%	0.42
	51-100 beds	1,439	56%	36%	52%	43%	7%	18%	6%	0.59
	101+ beds	1,702	65%	28%	55%	44%	6%	20%	6%	0.82
	TOTAL	4,416	53%	29%	49%	42%	8%	17%	6.6%	0.63
For-profit	3-50 beds	878	67%	22%	50%	47%	8%	16%	6%	0.60
	51-100 beds	2,300	70%	24%	50%	46%	7%	19%	7%	0.79
	101+ beds	2,382	73%	20%	51%	45%	7%	19%	7%	0.88
	TOTAL	5,560	71%	22%	50%	46%	7%	18%	6.5%	0.80
Chain										
Nonprofit	3-50 beds	288	24%	26%	34%	36%	13%	9%	11%	0.41
	51-100 beds	435	55%	37%	52%	42%	6%	19%	5%	0.56
	101+ beds	468	62%	30%	53%	45%	6%	20%	6%	0.81
	TOTAL	1,191	50%	32%	48%	42%	8%	17%	7.0%	0.62
For-profit	3-50 beds	689	41%	19%	40%	43%	13%	12%	10%	0.48
	51-100 beds	2,389	68%	23%	51%	44%	7%	17%	7%	0.72
	101+ beds	3,214	69%	20%	51%	45%	8%	17%	7%	0.93
	TOTAL	6,292	66%	21%	50%	44%	8%	17%	7.3%	0.80
ANOVA F-Test*			a,b,c	b,c	a,b,c	a,b,c	a,c	a,c	a,c	b,c
CHAINS ONLY										
Nonprofit	2-10 homes	808	48%	31%	48%	42%	8%	17%	7.7%	0.62
	11-50 homes	190	49%	31%	47%	39%	8%	13%	7.0%	0.65
	51+ homes	193	60%	35%	51%	41%	4%	21%	4.1%	0.57
	TOTAL	1,192	50%	32%	48%	42%	8%	17%	7.0%	0.62
For-profit	2-10 homes	1,982	71%	21%	50%	45%	8%	19%	6.6%	0.84
	11-50 homes	1,529	65%	22%	50%	44%	8%	17%	7.4%	0.85
	51+ homes	2,781	62%	21%	49%	44%	8%	15%	7.8%	0.75
	TOTAL	6,292	66%	21%	50%	44%	8%	17%	7.3%	0.80
ANOVA F-Test*			b,d	b	b	b,d	d	d	d	b,d

* For Test of differences across categories, we use an F-test in an ANOVA. Statistical significance at p<.01 denoted

for a=chain ownership, b=proprietary ownership, c=facility size, d=chain size.

References

- Aaronson, W.E., J.S. Zinn, and M.D. Rosko. (1994). Do for-profit and not-for-profit nursing homes behave differently? *The Gerontologist* 34:775-786.
- Baum, J.A.C. (1996). Organizational ecology. In *Handbook of Organization Studies*, ed. S.R. Clegg, C. Hardy, and W.R. Nord. Thousand Oaks, CA: Sage, pgs 77-144
- Baum, J.A.C. (1999). The rise of chain nursing homes in Ontario, 1971-1996. *Social Forces* 78: 543-584.
- Cohen, J.W. and L.C. Dubay. (1990). The effects of Medicaid reimbursement method and ownership on nursing home costs, case mix and staffing. *Inquiry* 27: 183-200.
- Greve, H.R. and J.A.C. Baum. (YEAR). Introduction: A multiunit, multimarket world. In *Multiunit Organization and Multimarket Strategy: Advances in Strategic Management, volume 18*, 1-28 (Oxford: Elsevier/JAI).
- Harrington, C. and H. Carillo. (1999). The regulation and enforcement of federal nursing home standards, 1991-1997. *Medical Care Research and Review* 56(4): 471-494.
- Harrington, C.S., S. Woolhandler, J. Mullan, H. Carillo, and D.U. Himmelstein. (2001). Does investor ownership of nursing homes compromise the quality of care? *American Journal of Public Health* 91(9): 1452-1455.
- Hirth, R.A. (1999). Consumer information and competition between nonprofit and for-profit nursing homes. *Journal of Health Economics* 18: 219-240.
- Holmes, J.S. (1996). The effects of ownership and ownership change on nursing home industry costs. *Health Services Research* 31: 327-346.
- Lee, A.J., H. Birnbaum, and C. Bishop. (1983). How nursing homes behave: a multi-equation model of nursing home behavior. *Social Science and Medicine* 17(23): 1897-1906.
- Lemke, S. and R.H. Moos. (1989). Ownership and quality of care in residential facilities for the elderly. *The Gerontologist* 29: 209-215.
- Marlin, D., M. Sun, and J.W. Huonker. (1999). Strategic groups and performance in the nursing home industry: a reexamination. *Medical Care Research and Review* 56(2): 156-176.
- McKay, N. (1991). The effects of chain ownership on nursing home costs. *Health Services Research* 26: 109-118.
- McKelvey, B. (1982). *Organizational Systematics*, Berkeley: University of California Press.
- Mukamel, D.B. (1997). Risk-adjusted outcome measures and quality of care in nursing homes. *Medical Care* 28(10): 952-962.
- O'Neill, C., C. Harrington, M. Kitchener, and D. Saliba. (2003). Quality of care in nursing homes: An analysis of relationships among profit, quality and ownership. *Medical Care* 41(12): 1318-1330
- Robinson, J.C. (2001). Organizational economics and health care markets. *Health Services Research* 36(1-2): 177-189.

- Rosko, M.D., J.A. Chilingirian, J.S. Zinn, and W.E. Aaronson. (1995). The effects of ownership, operating environment, and strategic choices on nursing home efficiency. *Medical Care* 33: 1001-1021.
- Scully, T. (2002). Health Care Industry Market Update Nursing Facilities. Published by the Centers for Medicare & Medicaid Services, February 6, 2002.
- Weisbrod, B.A. and M. Schlesinger. (1997). Public, private, nonprofit ownership and the response to asymmetric information: the case of nursing homes. In *The Economics of Nonprofit Institutions: Studies in Structure and Policy*, ed. S. Rose-Ackerman. New York: Oxford University Press, pgs. 133-51.

ENDNOTES

¹ For simplicity's sake, we focused on 1996, the most recent observation year for which reporting was complete. We did not observe substantive differences if the same comparisons were made in earlier years. State inspections are mandated on an annual basis, although the time between inspections in these data can be greater than a year (the mean time between inspections was 374 days). For our analyses, we use the earliest facility inspection report in 1996.

² We have excluded government-owned facilities because these facilities operate in a fundamentally different environment.

³ To define chain membership, we used a line-by-line inspection of the corporate names reported by facilities and available in the OSCAR (in the more than 100,000 records), and assessed inconsistencies by comparing name spellings and inter-temporal relationships for specific homes. We confirmed ownership for large chains using the *Medical and Healthcare Marketplace Guide* (Dorland's Biomedical Publications). We found that approximately 6% of nursing homes reporting chain membership in the OSCAR were cases of single-home holding companies. This suggests that research on chains that has relied on the OSCAR data might be confounded by a failure to distinguish single-home holding companies from nursing homes operated by multi-unit chain organizations.

⁴ We scaled each facility's number of deficiencies by the mean number of deficiencies for facilities in the relevant state because previous research has found substantial state-level variation in the number of citations (Harrington and Carillo 1999).

⁵ By "smallest" nursing homes we mean those with fewer than 50 beds.