

# DO MEDICAID AND PRIVATE-PAY NURSING HOME RESIDENTS HAVE EQUAL ACCESS TO QUALITY CARE IN TEXAS NURSING HOME MARKET?

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## Abstract

Using panel data from nursing homes in Texas over a 12-year period and applying a system panel data approach, this paper investigates whether Medicaid and private-pay nursing home residents have equal access to quality care. Our regression results suggest that even in the nursing home market with excess capacity, Medicaid patients do not have the same level of access to quality care measured in terms of the proportion of residents with pressure and the proportion of residents with bowel or bladder incontinence.

Keywords: Access to quality nursing home care; Outcome quality care; System dynamic panel data estimator; Nursing home utilization; Dual role of healthy seniors

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## 1. Introduction

In the United States, the share of population over 65 years old has increased from 9 percent in 1960 to 13 percent in 2010 [Bureau of Census, 2010], which is expected to exceed 20 percent in 2040. Since about 43 percent of seniors aged 65 or above will use nursing home care at some point during the rest of their lives [Kemper and Murtaugh 1991], nursing home care constitutes a sizable portion of health expenditures. Despite the importance and size of the nursing home care market, our understanding of the determinants for nursing home care is still far from sufficient. An important question that has not been answered sufficiently is whether nursing home residents, regardless of their pay sources, have equal access to quality nursing home care.

While Medicaid paid around 63 percent of nursing home care [Henry Keiser Family Foundation 2013], there are still many residents who pay privately out-of-pocket. In addition, many states set the Medicaid reimbursement rate generally below the private pay rate. Medicaid residents, therefore, may face a significantly different budget constraint from those private-pay residents. They are also more likely to face access problems, especially access to quality care. In this study, we investigate whether Medicaid-eligible and private-pay residents have the same ability to choose the home that provides the adequate care they desire.

We apply a new method of system panel data approach using data from individual nursing homes in Texas to address this issue. Our study is restricted to the state of Texas

for several reasons. First, by using data from only one state we avoid the problem of potential bias resulting from inaccurate measures of state policies on Medicaid over time. Second, Texas has a large nursing home market with more than 1000 nursing home facilities. Since the state relaxed its certificate-of-need law in 1986, the nursing home industry has been operating with excess capacity. Based on our data analysis, the average occupancy ratio fluctuated in a narrow range between 76.2 percent and 81.9 percent. Additionally, the median private-pay rate in Texas was \$92.76 per day in 2002, slightly lower than the Medicaid daily reimbursement rate of \$94.43 [Knots et al., 2006]. This almost identical rate for Medicaid and private-pay residents, coupled with the excess capacity, makes Texas an ideal market to answer our question. If there is a difference in access to quality nursing home care by pay sources in a market with identical cost and excess supply, this conclusion may still hold for those states with excess demand (if any) and dramatic differences in nursing home care prices.

When individual nursing home data are used to estimate access to quality care, there are two important empirical issues to address. First, nursing home stay is considered by many as the last resort for the most fragile, and the average stay in nursing home is more than 24 months (1.9 years for males and 2.8 years for females) [Murtaugh et al. 1997]. Nursing home utilization, therefore, is dynamic in nature because the number of current residents depends on past residents and the explanatory factors in the current period. Single-period, cross-section data, however, rarely provide sufficient information for earlier time periods. Studies based on single-period, cross-section data, therefore, cannot capture this dynamic relationship. Second, when measures of nursing home care quality are used as explanatory variables, there is always a concern that those variables may be endogenous since nursing home care quality may be correlated with unobserved factors such as management attitude towards providing adequate quality of care, nursing home culture, management style, and management efficiency.

To address these two issues, this paper uses a panel dataset over a 12-year period and applies the system panel data approach to investigate whether there is a difference in access to quality care by pay sources in the nursing home market. This new approach enables us to capture the dynamic nature of nursing home utilization while correcting for endogeneity issues. In this GMM framework, endogenous quality

variables, both in levels and in first differences, are instrumented by their first and higher order lags. Additionally, this approach also helps reduce the bias from time-invariant omitted variables. Our regression results suggest that even in the nursing home market with excess capacity, Medicaid patients do not have the same level of access to quality care measured in terms of proportion of residents with pressure and proportion of residents with bowel or bladder incontinence.

## **2. Background**

### *2.1. Nursing home access and quality: conceptual framework*

Elderly individuals in the U.S. who have self-care disabilities have a variety of care options including but not limited to home health care, assisted living facilities, senior daycares, and nursing homes. Since a nursing home is considered most restrictive, its determinants can be related to many factors that reflect the individual's health condition, household income and wealth, as well as public policies such as state Medicaid generosity and coverage. Other things equal, an incentive for an elderly to choose a particular nursing home could be the quality of care provided.

In contrast to Chiswick [1976]' unified nursing home market, Scanlon [1980] indicates that there are two distinct markets for nursing home care dependent on residents' pay sources. When nursing home care is funded by public payment mechanisms, Scanlon argues that economic variables are less relevant compared to decision-making process of nursing home managers. Analyzing decisions of nursing home admission by managers in both for-profit and non-profit homes, Scanlon concludes that both types of nursing homes are motivated to practice price discrimination and allocate beds by setting the private-pay marginal revenue equal to the Medicaid reimbursement rate. Thus, private-pay demand is satisfied first and any remaining beds are filled by Medicaid patients. This creates the problem of excess Medicaid demand. Many other studies later on are built upon this conceptual framework of excess demand.

Under the excess demand model, it may be logical to expect that Medicaid residents will have access to those homes least capable of competing successfully for private-pay residents, perhaps due to lower quality of care. As a result, public-pay residents often have no option but to enter whatever facility will accept them, even though it may provide undesirable quality of care [Hawes and Phillips 1986].

The excess demand model for nursing home care, however, may no longer be canonical because of the divergent trend of nursing home utilization and change in public policies during the past 25 years. The use of excess demand model is justified before 1987 when the growth rate of resident population had been higher than that of elderly population over 75 years old (the major components of nursing home residents) and the federal certificate-of-need regulation was still in place. This was no longer the case since 1988. The growth rate of nursing home users has remained flat despite continuous increase in the elderly population aged at least 75. Additionally, the lapse of the federal certificate-of-need requirement in 1987 also changed the regulatory factor in nursing home market. Currently, 14 states no longer have certificate-of-need or construction moratorium regulations in effect for nursing home facilities. Even in those states maintaining this regulation, their focus shifted to outpatient facilities and long term care [National Conference of State Legislature 2015]. Decline in per capita use of nursing home facilities, together with the removal of nursing home supply constraints [Lakdawalla and Philipson, 2002], provides justification for us to describe the nursing home market as a monopolistic competitive market with excess capacity [Grabowski et al., 2003; Shellenbarger, 2002a, b; Smith, 2002].

Under the conceptual framework of monopolistic competition, nursing homes are motivated to practice product differentiation with respect to care quality, convenience and attractiveness of location, and other amenities. Nursing home residents and prospective residents are assumed to act like rational consumers by staying at or selecting those nursing home facilities that best meet their needs. Based on this assumption, the hypothesis is that other things being equal, the higher the quality of nursing home care, the higher utilization ratio. Another related hypothesis is that regardless of pay sources, when care quality is considered, nursing home users have the same ability to choose the nursing home that provides the adequate quality of care they desire.

During the past twenty years, there has been intensive concern regarding the importance of long-term care as a result of pressures from several key market participants. First, there is increasing pressure from the oldest of the elderly population because of longer life expectancy. Meanwhile, Medicaid paid around 63 percent of nursing home care in 2013. These factors, thus, have upward pressure on nursing home

uses. As discussed in Lakdawalla and Philipson [2002], nursing home uses per capita declined, especially after mid-1990. They argue that healthy-aging populations decreased the output of the nursing home market care directly by shrinking the base of population who need care and indirectly by increasing the number of caregivers. This poses another hypothesis of interest in this paper.

## *2.2. Literature review on related work examining nursing home access and quality care*

Many earlier studies on nursing home access has been built upon the framework of excess demand, under which access to care by public-pay and “heavy-care” residents are not the same as private-pay residents [Cotterill 1983; Feder and Scanlon 1980; Greenlees, et al. 1982; Scanlon 1980a, 1980b; Schlenker 1986].

Based on interviews in eight states in 1978, Feder and Scanlon find that the majority of the states they visited reported access problems for their Medicaid-eligible individuals. This access problem is even worse for those with heavy-care needs. Lee et al. [1983] find similar results even data and methods are different. Their result confirms that public-pay residents had less access to nursing home care relative to private-pay residents. Nyman [1989a] assesses the impact of excess demand on access to nursing home care for Medicaid recipients in Wisconsin. They find that an increase in excess demand decreases Medicaid-eligible individuals’ access to care. Further empirical evidence from many other studies using data during the same time periods support the above findings and the excess demand model [Cohen and Dubay, 1990; Ettner, 1993; Gertler, 1992; Harrington and Swan 1987; Reschovsky, 1996]

Differing from those based on state-level data, studies based on individual data have mixed findings. Cutler and Sheiner [1994] examine the effect of state variation in Medicaid policies on nursing home admission using the 1982 and 1984 waves of the National Long-Term Care survey and find there exists a negative relationship between Medicaid underpayment and nursing home utilization. A similar finding is obtained by Hoerger et al [1996]. Other studies, however, suggests there is little impact of Medicaid policy on nursing home use [Reschovsky, 1996; Norton and Kumar, 2000; Grabowski and Gruber, 2007].

The majority of the early empirical research on nursing home quality utilizes Scanlon’s model of a monopolistically competitive market in which the same level of

care is assumed to provide to both private-pay and public-pay residents. Nyman (1988a) estimates the relationship between excess demand and nursing home expenditures, a proxy for care quality. When excess demand exists, nursing homes could benefit financially from lower costs, not through management efficiency, but through lowering quality of care. This is because prospective residents, especially Medicaid-eligible individuals, are usually forced to accept the first bed that becomes available regardless of the quality of the home. Utilizing the same data set, Nyman [1989b] finds that nursing homes in counties with a tighter bed supply have more Medicaid violations than those counties with a surplus bed supply.

A group of scholars focus on the effect of a change in Medicaid reimbursement rate on quality and their findings are mixed. Gertler [1989] finds that an increase in the Medicaid reimbursement rate improves access for Medicaid residents but lowers quality. The same conclusion is drawn in Nyman [1988] and Gertler [1992]. On the other hand, Cohen and Spector [1996] find that the effect of the increase in Medicaid reimbursement on quality of care is not consistent when different model specifications are applied.

Grabowski [1999, 2001a, 2001b] investigated the same question based on a larger sample and newer dataset. Grabowski's results show that an increase in the Medicaid reimbursement rate leads to a small but significant increase in nursing home quality. These results are contrary to the results obtained by Nyman and Gertler. Grabowski attributes this result, in part, to declining level of excess demand over time.

Our discussion of studies on access to nursing home care and quality of care certainly cannot exhaust the literature, but they appear to represent the major focus and results. It is obvious that access to nursing homes and quality of care are treated as separate topics in the majority of earlier studies. This may be due to the fact that under the conditions of excess demand, nursing home care providers have no incentive to compete for Medicaid residents on the basis of quality since at any quality level a sufficient number of Medicaid residents are available to fill an empty nursing home bed. In this paper, we intend to investigate whether access to nursing home care and care quality are interactive. In particular, we examine whether Medicaid-eligible and private-pay residents have equal access to quality nursing home care in a monopolistic competitive market with excess capacity.

### 3. Data and variables used in this paper

The major data source for this paper is the On-Line Survey, Certification, and Reporting (OSCAR) system. Supplementary data are obtained or constructed from two sources: the Bureau of Economic Analysis and Bureau of Census's Population Projection.

The OSCAR data system is a repository for data that is collected by state surveyors for all federally certified Medicare and Medicaid nursing home facilities in the United States. The OSCAR data report information on facility characteristics (size, ownership, certification status, and resident mix), staffing characteristics, resident characteristics (such as the average number of activities of daily living (ADL) of the nursing home's residents and the number of residents with physical restraints), and survey deficiencies (17 major categories that include resident rights, quality of life, nursing services, and quality of care).

We use two dependent variables to measure access to nursing homes: the number and the percentage of residents by pay sources (Medicaid and private-pay). The explanatory variables used in this paper can be categorized into three groups: measures of quality of nursing home care; nursing home characteristics in ownership and staffing; and economic, demographic and market characteristics at the county in which the nursing home is located. All the variables are measured in the period between 1992 and 2003.

#### *Measures of quality of nursing home care*

Since there is no universally accepted measure of health care quality, we utilize process, outcome, and input measures of quality. The process-based measure of quality used in this paper is the proportion of residents with catheters (PROPCATHETER). While this measure is not an actual measure of health status, it was used as a proxy for negative nursing home quality. We use two outcome measures of quality: the proportion of residents with pressure sore and the proportion of residents with bowel or bladder incontinent. Pressure sores are an injury to the skin and nearby tissues. People who are confined to a bed or chair and unable to move are most likely to develop pressure sores. Pressure sores are thus often used as a measure of negative nursing home quality since they are treatable and preventable conditions [Grabowski 2001b; Harrington et al., 2000; Smith, 1995]. Bowel or bladder incontinent is also considered as a negative measure of quality in the literature [Donabedian 1988].

Our data do not provide information on how much of the proportion of residents with a urethral catheterization and with pressure sores are attributable to Medicaid residents and private-pay residents, respectively. Following the evidence of Grabowski et al. [2006], we believe that the assumption that these measures are distributed proportionally among public- and private-pay residents in a facility is reasonable.

The input-based measures of quality include two variables: registered nurse hours per resident per day (RNNURSEHOURS), and licensed practical nurse hours per resident per day (LPNNURSEHOURS). Although scholars disagree on whether greater staffing reflects improved quality or increased inefficiency [Grabowski 2004], we believe these variables should be included as control variable to capture inter-facility differences in care cost considering the fact that staffing accounts for over two-thirds of all nursing home expenditures and the majority of nursing homes operate for-profit in our sample.

#### *Facility-level characteristics*

The first facility-level characteristic is the total number of beds in a facility. This variable represents the size of the facility. The second facility-level characteristic represents the nursing home's ownership type. Two dummy variables are created to reflect if the facility is for-profit (FORPROFIT) or government owned (GOVOWNED). The nonprofit is the base category. In conjunction with ownership type, we include two dummy variables that control for whether or not the nursing home is part of a multi-chain facility (MULTIORG) and whether a nursing home is hospital based.

Since nursing homes serve different types of residents requiring different levels of care, we include an indicator of level of care needed. Following Katz et al [1963], we use the ADL index. The ADL index used in this paper is calculated by summing various levels of dependencies in eating, toileting, transferring, and mobility (weighted by the respective proportion of residents). The higher the value of this index, the more dependent the resident is in the functions mentioned above.

#### *County economic and demographic characteristics*

When estimating nursing home demand, most studies use the county in which the nursing home is located as the proxy for the nursing home market [Cohen and Spector, 1996; Zinn, 1994; Lakdawalla and Philipson, 2002] based on the reasoning that majority of nursing home residents lived in the same county as the nursing home [Nyman, 1985;

Gertler, 1992] and federal block grants for long-term care services are distributed at the county level [Banaszak-Holl et al., 1996]. In this paper, we incorporate county-level economic and demographic characteristics as control variables.

Since 91 percent of nursing home residents are 65 years or older, our first variable in this group is the senior ratio (SENIORRATIO) defined as the percentage of population at least 65 years old. We also use county per capita personal income, adjusted for 2003 dollars to control for the economic factor in the market of nursing homes. To reflect market competition among nursing homes, we use the number of competitors in the county.

Lakdawalla and Philipson argue that aging may lower the demand for long-term market care by increasing the supply of family care givers. Since the average life expectancy for men is lower than that for women, growth in elderly males causes couples to stay married longer, which increases care from the spouse and lowers the demand for nursing home care. Following Lakdawalla and Philipson, male-female ratio by age group is used to control for the gender distribution among the elderly. We derive male-female ratio for the elderly in three groups: aged between 75 and 79; between 80 and 84; and, above 85.

#### **4. Methodology and Model Specification**

##### *Methodology*

This paper applies dynamic panel data approach to investigate whether residents of different pay sources have equal access to quality care. Since nursing home residents' average stay is ranged from 18 months to 24 months, nursing home uses can be dynamic, which makes fixed effect or random effect inappropriate. Since the number and percentage of nursing home residents (our measure of access) is a function of a nursing-home-invariant error term, it follows that the lagged value of this variable is also a function of the unobserved nursing-home-invariant term, which means that the lagged dependent variable is correlated with the error term. This makes OLS estimator biased and inconsistent. Additionally, as discussed in the introduction, measures of nursing home care quality could be endogenous since they may be also correlated with the unobserved nursing-home-invariant error terms.

Considering these potential endogeneity of quality variables and the dynamic nature of nursing home uses, the system dynamic panel data estimation is used to estimate the model (Arellano-Bover/Blundell-Bond linear dynamic panel data estimation in Stata with command xtdpdsys).

### *Model Specification*

For individual nursing homes, nursing home utilization is assumed to be a function of normal economic influences. Nursing home residents (or their agents) may select to stay in a nursing home or move to another nursing home for their best interest. Based on this adjustment, the number of nursing home residents is posited to be a function of residents' needs, nursing home quality, nursing home facility characteristics, including size, ownership, and staffing, as well as economic and demographic characteristics in the county in which the nursing home is located.

$$\begin{aligned} \text{Number of Res}_{i,t} = & \beta_0 + \beta_1(\text{PROPCATHETER}) + \beta_2(\text{PROPTRAINING}) \\ & + \beta_3(\text{PROPPRESSORE}) + \beta_4(\text{RNURSEHOUR}) + \beta_5(\text{LPNHOURSPE}) \\ & + \beta_6(\text{FORPROFIT}) + \beta_7(\text{GOVOWNED}) + \beta_8(\text{MULTIORG}) \\ & + \beta_9(\text{HOSPITALBASED}) + \beta_{10}(\text{NCOMPETITOR}) + \beta_{11}(\text{SENIORRATIO}) \\ & + \beta_{12}(\text{INCOME}) + \beta_{13}(\text{MF7579}) + \beta_{14}(\text{MF8084}) \\ & + \beta_{15}(\text{MF85}) + \beta_{16}(\text{SIZE}) + \beta_{17}(\text{Number of Residents}_{i,t-1}) + \beta_{18}(\text{TOTBED}) \end{aligned}$$

## **5. Regression Results**

This section presents empirical results. System dynamic panel data (DPD) estimates for both private-pay and Medicaid-pay residents are reported in Table 3. In general, the system DPD estimates fit the data well as shown by the regression statistics. In particular, the null hypothesis that all coefficients are jointly zero are rejected at the level of at least 0.0001 based on the *Wald* test. There is no evidence of second-order serial correlation and the Sargan statistic does not reject the over-identification restriction. Therefore, the system DPD estimation is appropriate for the analysis.

The coefficients for the lagged value of dependent variable are both positive and statistically significant at the level of at least 0.001. This finding suggests that the nursing home residents both in absolute number and percentage depend on the number of past residents. The relatively small magnitude of this variable also suggests that nursing home residents or their agents may act differently from those in the era of excess

demand, who were reluctant to move or switch between nursing homes [Nyman, 1985; Bishop,1988; Weisbrod and Schlesinger, 1986].

Three measures of nursing home quality are used in this study while controlling for the average functioning level for the residents in each facility for each year. The process quality variable is the proportion of residents with catheters. The coefficient of this variable for number of private-pay residents and Medicaid patients are both statistically negative, suggesting the lower the process quality, the fewer the residents. When percentage of residents by pay source is used as a dependent variable, the coefficient of this variable is still negative, but not statistically significant. This finding suggests that this process quality has a negative impact on nursing home uses.

Nursing home residents respond to the outcome measures of quality differently. The coefficients of the proportion of residents with pressure sores for private-pay patients (measured in absolute number and percentage) are both negative and statistically significant at the level of at least 0.05, while the coefficient of this variable for Medicaid-pay residents are positive and statistically significant at the level of 0.05. Since this variable measures negative quality of nursing home care because pressure sores are treatable and preventable, this finding suggests that the nursing homes providing lower outcome quality of care attract or retain fewer private-pay residents. As a result, they will admit more Medicaid patients until the marginal revenue from both pay sources are equal. When the proportion of residents with pressure sores increases by 1 percent, number of private-pay residents is reduced by 0.33 percent while the number of Medicaid patients increased by 0.057 percent.

The proportion of residents with bowel or bladder incontinence is another negative outcome measure of quality. When the number of residents by pay source is used as a dependent variable, its coefficient for private-pay residents is statistically negative at the level of 0.001, while it is statistically positive for Medicaid-pay residents. When the proportion of residents with bowel or bladder incontinence increases by 1 percent, the number of private-pay residents is reduced by 0.21 percent while number of Medicaid patients increased by 0.056 percent. When the percentage of residence by pay source is used, its coefficient for private-pay residents is negative while it is positive for Medicaid-pay residents, but they are not statistically significant. Combined with the

findings regarding the proportion of residents with pressure sores, this finding seems to suggest that private-pay patients have more access to quality care. In terms of outcome quality of care, private-pay users or their agents have more freedom to stay in or move to other nursing homes providing adequate quality of care they desire than Medicaid residents.

We use four dummy variables to control for nursing home ownership and structure characteristics. It is obvious that for-profit nursing homes and nursing homes owned by multi-facility organizations or hospital-based are likely to have higher uses from Medicaid-pay residents. The coefficient of number of competitors in the market is positive and statistically significant at the level of 0.001 for Medicaid-pay residents, but not statistically significant for private-pay residents. This finding suggests as the increase in competition, nursing homes are more likely to admit more Medicaid-pay residents to increase their profit. This result may suggest that even in a market with excess capacity, access to nursing home care is still much easier for private-pay residents. As expected, nursing home size has a positive impact on access to care.

We use five variables to control for county-level economic and demographic characteristics. The coefficient of real per capita income is positive for private-pay residents but negative for Medicaid-pay residents. The effect of senior ratio is not significant.

Three male-female ratios are added to test the hypothesis that healthy-aging populations decreased the output of nursing home market care directly by shrinking the base of population who need care and indirectly by increasing the number of caregivers. Among the three male-female ratio by age groups, the coefficients of the male-female ratio for people aged between 75 and 79 are negative and statistically significant at the level of 0.001. This result seems to support the senior's dual-role hypothesis, suggesting that for people aged in their late 70's, healthy seniors can be suppliers of long-term care, which reduces the demand for nursing home care. For people aged between 80 and 84, the coefficient of male-female ratio is not consistent and not statistically significant. The coefficient of male-female ratio for people aged at least 85, however, is positive although it is not statistically significant for Medicaid residents. These findings may imply that the hypothesis that healthy seniors could reduce demand for nursing home

care as caregivers for their spouse seems to be true for people aged in their late 70's, but this result does not hold for the oldest of the elderly.

## **6. Conclusion**

This paper applies a systematic panel data approach to investigate whether pay sources affect nursing home residents' access to quality care based on nursing home facility data in the Texas market. Regression results indicate Medicaid patients do not have the same level of access to quality care measured in terms of proportion of residents with pressure and proportion of residents with bowel or bladder incontinence even in the market of excess supply.

These findings have important implications for potential nursing home users, private long-term care insurance companies, and policy makers. Since different levels of access to quality nursing home care exist by pay sources, this may exaggerate the segregation of nursing homes in the long-term care market. For those facilities that provide high quality of care, they are more likely to become private-pay predominant while those facilities providing lower quality of care may become Medicaid predominant. Given the options in the long-term care market, many individuals now exhaust their resources in other less restrictive facilities such as the assisted living sector before moving in Medicaid-pay nursing home. Considering the difference in access to quality care and the segregation trend of nursing homes, those potential nursing home users may change their transition path. Private long-term care insurers should also consider this factor when pricing and marketing their insurance products. For policy makers in the long-term care industry, unequal access to quality nursing home care makes it difficult to justify reducing the Medicaid reimbursement rate, which will even lower the quality of care delivered.

Table 1: Summary of Statistics

<i>Variable</i>	<i>Mean</i>	<i>Standard deviation</i>	<i>Minimum</i>	<i>Maximum</i>
<i>Private Pay Resident</i>	16.07	14.43	0	161
<i>Medicaid Resident</i>	64.68	29.80	1	280
<i>ADL Index</i>	10.06	1.27	3.48	15.97
<i>Prop. of Residents with of Pressure Sores</i>	0.07	0.05	0	1
<i>Prop. of Residents with of Catheters</i>	0.09	0.07	0	1
<i>Proportion of residents receiving bowel or bladder training</i>	0.03	0.04	0	0.96
<i>Registered Nurse Hours Per Resident per Day</i>	0.14	0.13	0	2.22
<i>Licensed Practical Nurse Hours per Resident per Day</i>	0.73	0.29	0	5.81
<i>Total Beds Available</i>	108.55	45.32	21	445
<i>Number of Competitors</i>	15.45	18.45	0	56
<i>County Average Personal Income</i>	24242.6	5663.26	8162	129366
<i>Senior Ratio</i>	0.13	0.05	0.05	0.35
<i>Male-Female Ratio (75-79)</i>	0.70	0.08	0.44	1.42
<i>Male-Female Ratio (80-84)</i>	0.58	0.09	0.27	1.06
<i>Male-Female Ratio (85+)</i>	0.41	0.07	0.16	0.95
<i>N</i>	9443			

Table 2: Correlation Matrix of Facility Measures

	<i>ADL Index</i>	<i>Prop. of Residents with of Pressure Sores</i>	<i>Prop. of Residents with of Catheters</i>	<i>Proportion of residents receiving bowel or bladder training</i>	<i>Registered Nurse Hours Per Resident per Day</i>	<i>Licensed Practical Nurse Hours per Resident per Day</i>
<i>ADL Index</i>	1.00					
<i>Prop. of Residents with of Pressure Sores</i>	0.19	1.00				
<i>Prop. of Residents with of Catheters</i>	0.21	0.22	1.00			
<i>Proportion of residents receiving bowel or bladder training</i>	0.007	0.009	0.015	1.00		
<i>Registered Nurse Hours Per Resident per Day</i>	0.092	0.13	0.04	0.012	1.00	
<i>Licensed Practical Nurse Hours per Resident per Day</i>	0.096	0.07	0.08	0.048	0.067	1.00

Table 3: Regression Result

<i>Variable</i>	<i>Number of Medicaid-Pay Residents</i>	<i>Number of Private- Pay Residents</i>	<i>Percentage of Medicaid-Pay Residents</i>	<i>Percentage of Private- Pay Residents</i>
<i>Lagged Dependent Variable</i>	0.20***	0.09***	0.17***	0.18***
<i>L1</i>	(27.52)	(18.73)	(15.11)	(17.37)
<i>ADL Index</i>	0.49***	-1.27***	-0.19	-0.75***
	(4.71)	(18.24)	(1.13)	(4.76)
<i>Prop. of Residents with of Pressure Sores</i>	3.69**	-4.96***	7.47**	-0.98***
	(2.36)	(4.58)	(2.03)	(2.96)
<i>Prop. of Residents with of Catheters</i>	-4.83***	-4.92***	-2.10	-3.21
	(2.77)	(5.14)	(0.68)	(1.26)
<i>Proportion of residents receiving bowel or bladder training</i>	3.60***	-3.16***	1.29	-1.32
	(4.85)	(5.02)	(1.00)	(1.08)
<i>Registered Nurse Hours Per Resident per Day</i>	-10.05***	-8.41***	0.44	-4.46
	(9.61)	(13.34)	(0.29)	(1.27)
<i>Licensed Practical Nurse Hours per Resident per Day</i>	-3.32***	-8.40***	3.13***	-5.74***
	(8.66)	(25.38)	(4.29)	(8.07)
<i>For-Profit</i>	0.80**	-3.82***	3.44***	-4.17***
	(2.14)	(9.71)	(3.99)	(5.45)
<i>Government-Owned</i>	-1.34	-0.43	-0.23	-2.94
	(0.80)	(0.34)	(0.07)	(1.02)
<i>Multi-Chain Organization</i>	0.30	-1.63***	0.74*	-1.40***
	(1.00)	(6.32)	(1.90)	(3.89)
<i>Hospital-Based</i>	1.89	-2.0	8.06***	-4.48
	(1.14)	(1.45)	(4.03)	(2.10)
<i>Total Beds Available</i>	0.34***	0.13***	0.05***	0.011
	(26.06)	(16.24)	(4.13)	(0.98)
<i>Number of Competitors</i>	0.43***	0.045	0.22***	0.13***
	(10.31)	(1.50)	(5.67)	(3.72)
<i>County Average Personal Income</i>	-0.0005***	0.0008*	-0.0001*	0.0007
	(9.28)	(1.79)	(1.65)	(1.21)
<i>Senior Ratio</i>	-2.90	20.87*	21.35	-8.36
	(0.19)	(1.84)	(1.41)	(0.63)
<i>Male-Female Ratio (75-79)</i>	-17.29***	-14.56***	-6.25**	-15.01***
	(9.52)	(8.96)	(2.11)	(6.54)
<i>Male-Female Ratio (80-84)</i>	1.79	-9.69***	4.05*	-8.54**
	(1.19)	(6.20)	(1.92)	(4.00)
<i>Male-Female Ratio (85+)</i>	2.42	10.32***	17.82***	12.46***
	(1.10)	(4.94)	(4.93)	(3.72)
<i>Constant</i>	31.55***	30.30***	62.11***	41.90***
	(8.12)	(9.92)	(13.82)	(10.54)
<i>Sargan Test of Over-identifying Restrictions</i>	chi2(448) =476 (0.1717)	chi2(448) =475 (0.1813)	chi2(448) =477 (0.1632)	chi2(448) =476 (0.1703)

<sup>a</sup> absolute value of t-statistics in parentheses. <sup>b</sup> \*2-tail significance at  $\alpha = 0.10$ . \*\*2-tail significance at  $\alpha = 0.05$ . \*\*\*2-tail significance at  $\alpha = 0.01$ .

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