

Miami University
Farmer School of Business

Department of Economics
Working Paper

***Ownership Conversion by Nursing Homes and the
Quality of Care***

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November 2009

Working Paper # - 2009-10

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Abstract: Nearly five percent of nursing homes converted from not-for-profit (NFP) to for-profit (FP) or FP to NFP between 1999 and 2004 because of changes to Medicare reimbursement. This paper examines the choice to convert and its effect on quality. Conversions were found to be associated with changes in quality after adjusting for the endogeneity of conversion. NFP to FP conversions were associated with a decrease in the use of physical restraints while the proportion of residents with pressure ulcers in facilities that converted from FP to NFP increased. Further, quality had significantly declined since the implementation of the reimbursement change.

[†] Acknowledgements: I thank Andrew Abere, David Grabowski, Roger Klein, Carolyn Moehling, and Martin Perry for helpful comments in all stages of the research.

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1. Introduction

In the provision of health care, asymmetric information between patients and providers can cause health care organizations to use their informational advantage to reduce the quality of care to increase profits. Legal regulations require that the net cash flows of not-for-profits (NFPs) be used only for the advancement of the organization's mission. This provides NFPs with a disincentive to use their informational advantage for financial gain because any excess profits cannot be passed on to shareholders (Hansmann, 1980). Since for-profits (FPs) can distribute net cash flows to their shareholders they have the incentive to use their informational advantage to increase profits. These differences in objectives and constraints can lead NFPs to provide higher quality services than FPs. As a result, ownership status is often considered a signal of quality (Hirth, 1999; Steinberg, 2006).

Although FPs have the incentive to use their informational advantage, FPs are more likely to employ resources efficiently, lowering the cost of care provision. Further, FPs are more flexible in their ability to raise capital and expand facilities (Jensen and Ruback, 1983). This permits FPs to provide services at a more competitive price and may explain the increase in the number of FPs in the health care industry during the last few decades. Part of this increase arose through ownership conversion from existing NFP organizations. For the purpose of this paper, ownership status is restricted to FPs and NFPs. A conversion may occur if a change in ownership status is caused by an amendment in the corporate charter which changes tax status or when an organization purchases a facility that was owned by an organization with a different ownership status. Since there are differences between FPs and NFPs in their incentives and costs, conversions can have an impact on the quality of care. Therefore, future policies that would promote one ownership status over the other should take into consideration the implication on the change in quality and cost. The purpose of this paper is to examine the empirical implications of ownership conversion in the nursing home industry.

Although there exists a large empirical literature on the differences in quality between FPs and NFPs,ⁱ there are few papers that address the effect of ownership conversion on quality. In an analysis of hospitals, Shen (2002) and Picone et al. (2002) found a significant increase in severity-adjusted mortality

associated with facilities that converted from NFP to FP but no significant change in mortality for facilities that converted from FP to NFP. Farsi (2004) analyzed two quality measures, namely mortality and hospital readmission, for patients admitted to a hospital for the two medical conditions of heart attack and congestive heart failure. For heart attack patients, he found a higher mortality rate in hospitals that converted from NFP to FP. For congestive heart failure patients, mortality rates were higher in patient admitted to hospitals that converted from FP to NFP. Readmissions were not found to be associated with ownership conversion. With respect to nursing homes, Stevenson and Grabowski (2007) used multiple quality measures, such as the proportion of residents who were physically restrained, used a catheter, or had a pressure ulcer, and found little difference in quality as a result of conversion.

The four studies that analyze the affect of ownership conversion treat the choice to convert as exogenous. Conversion is a choice made jointly with other decisions, such as prices, staff levels, and quality of care. This makes the choice to convert endogenous. When the empirical model does not account for endogeniety of conversion there is uncertainty if the effect of conversion on quality can be directly attributed to the ownership change. Therefore, policy makers need to understand the reasons for conversion and how these reasons can result in subsequent changes in quality. Policies which promote conversion in any particular direction can have long run consequences on quality and costs. This is especially relevant due to the competitive interactions in quality and price that exist when FP and NFP nursing homes compete in the same market (Kessler and McClellan, 2002; Grabowski and Hirth, 2003; Keller et al., 1999).

This paper extends the literature on nursing home ownership conversions and their effect on various measures of the quality of care. These measures include the proportion of residents with a pressure ulcer, those who are physically restrained, and those who are prescribed antipsychotic medications. The methodology takes advantage of the changes in nursing home reimbursement which arose from the Balanced Budget Act of 1997 (BBA). The BBA provides an exogenous shock that allows the initial ownership status and level of quality to be treated as exogenous. Further, the BBA affected all nursing homes and required them to assess their ownership and quality choices. The choice to convert is

estimated by a semiparametric estimation technique that allows for heteroscedasticity and is used as an instrument in the estimation of the impact of conversion on the quality of care. The results suggest that low cost NFPs and high cost FPs had a higher probability of conversion and these conversions had a subsequent impact on quality.

The rest of the paper is organized as follows. Section 2 discusses the BBA and how it affected the choice to convert by private nursing home facilities. Section 3 describes the estimation technique that determines the effect of conversions on quality and the instrument used to account for endogeneity. Section 4 describes the data and variables. Section 5 contains the results and a discussion of their policy implications. Section 6 features the conclusion.

2. The Balanced Budget Act of 1997

The BBA was a response to the perceived problems of nursing home reimbursement for skilled nursing. Prior to 1998, Medicare reimbursed nursing facilities on a fee-for-service (FFS) basis for skilled nursing care after a hospitalization. Under the FFS reimbursement mechanism, Medicare reimbursed separately for capital costs, routine services, and ancillary services. Facilities were paid under a cost-plus mechanism with different rates for routine services and ancillary services. The routine services of general nursing, room and board, and administrative expenses were subject to reimbursement limits. Further, most skilled nursing home patients require the use of ancillary services, such as physical, occupational, and speech therapy. Since ancillary services were not subject to reimbursement limits, facilities could increase their revenue from Medicare through provision of ancillary services (Dummit, 2000).

Facilities also engaged in strategic business practices that would increase their profits from the routine services under the FFS system. Two such practices were the sale and lease-back of the physical plant and the outsourcing of nursing staff. A facility that sold the physical plant would recognize a profit from the sale of the building. Further, these lease-back arrangements converted capital costs into operating costs which were more generously reimbursed under Medicare. The use of contracted staff

enabled nursing homes to reduce the fixed cost of training new staff. Any increase in variable cost through the use of contracted staff would be reimbursement by Medicare.

The generous reimbursement of FFS resulted in an increase in the total number of facilities certified for Medicare skilled nursing care. In 1987, just under half of all facilities were certified for Medicare reimbursement. In 1996, the number rose to 78% of all nursing facilities (Rhoades and Krauss, 1999). By 1999, the number of beds certified for Medicare increased to 90% of all nursing home beds (Harrington et al., 2006). The increase in the supply of beds certified for Medicare and the incentives of the FFS system caused skilled nursing to become the fastest growing expenditure by Medicare in the 1990's (US GAO, 1999).

The rise in Medicare spending on skilled nursing prompted Congress to include a provision within the BBA that changed the reimbursement system for skilled nursing home care from FFS to the Prospective Payment System (PPS). The PPS provided a fixed per diem rate designed to cover routine services, ancillary services, and capital costs for a typical nursing home. The fixed payment was adjusted for severity by classifying each patient in a resource utilization group. Regional adjustments were made to account for differences in nursing wages by geographic region. The system first affected facilities at the beginning of their next fiscal year on or after July 1, 1998. In the first year, facilities were reimbursed 25% of the PPS payment and 75% of the payment they would have received under FFS. Each subsequent year, the proportion of the PPS payment increased by 25% until 100% was reached in 2002 (Konetzka et al., 2004). A later amendment to the legislation allowed facilities to receive 100% of their payments under PPS if they were advantaged by the system (US GOA, 2002a).ⁱⁱ

The PPS system reduced the average reimbursement for skilled nursing care to 1995 levels and transferred financial risk to the nursing home. The legislation decreased Medicare's average per-diem reimbursement by 9% (Dummit, 2000) and reduced the revenue that skilled nursing facilities received from Medicare by two billion dollars in fiscal year 1999 (Medicare Payment Advisory Commission, 2003). The financial burden on facilities became evident when the five largest FP nursing home chains, accounting for 12% of all nursing facilities, filed for bankruptcy protection by the middle of 2000

(Dummit, 2000). Although the reimbursement change only affected payment for Medicare patients, a number of studies have shown that the BBA affected all nursing home residents (Konetzka et al., 2004; Konetzka et al., 2006; and Unruh et al., 2006). This effect arises because facilities provide care to two types of residents. Some residents require skilled nursing after hospitalization. This is primarily paid for by Medicare or private health insurance. The remaining residents require long term care which is primarily paid for by Medicaid or out-of-pocket. Since Medicaid reimburses at rates that only cover variable cost, facilities rely on Medicare reimbursement to cover fixed costs and earn a profit (US GAO, 2003; Troyer, 2002). The difference between the Medicaid reimbursement rate and average cost per patient day has been estimated at \$-12.58 (BDO Seidman, 2005). This is why Medicare is an important source of revenue for nursing homes.

The BBA placed a disproportionate amount of burden on nursing facilities with higher cost and greater reliance on Medicare FFS skilled nursing for revenue. Since the PPS bundled routine services, ancillary services, and capital costs into one fixed payment, facilities with high labor costs and capital expenditures needed to make operational changes. The PPS also equalized the payments between hospital-based and free-standing facilities (Konetzka et al., 2004). This caused significant financial pressure on hospital-based facilities because they are allocated higher capital costs than free-standing facilities and primarily provide care to skilled nursing patients. In fact, the difference between Medicare payments and Medicare costs expressed as a percentage, called the “Medicare margin,” proved highly negative (-53%) for hospital-based facilities but was positive (8%) for free-standing facilities in 1999 (US GAO, 2002a). Further, in the early 1990’s, managed care had implemented utilization review mechanisms to reduce payments for ancillary services (Angelelli et al., 2000). Therefore, facilities in counties with a higher percentage of elderly enrolled in Medicare managed care plan are more likely to be impacted from the PPS because they had prior experience with cost containment.

The strategies that high cost facilities employed to reduce costs varied with their experience under the PPS. Facilities reliant on ancillary services for revenues attempted to reduce the number of ancillary services provided to Medicare patients. Since ancillary services were bundled into the per diem rate, a

reduction in these services lowered the marginal cost of care provided to each patient. A United States General Accounting Office (2002b) report found that nursing homes had reduced the number of therapy minutes for medium to high need patients by 22% from 1999 to 2001. Further, the report found that facilities adapted new patient assessment practices for how patients were classified into resource utilization groups. Facilities learned how to identify the severity of nursing home residents to maximize revenues and align treatment with costs.

In the case of some high cost facilities, these strategies alone would not be sufficient to reduce costs and one option is to convert to NFP status. FPs would be unlikely to acquire a high cost facility in the attempt to reduce costs. However, NFPs typically have secular foundations or religious organizations which could provide alternative financial support. NFPs also have lower costs relative to FPs because of exemption from corporate, property, and sales taxes. This outside sponsorship and tax-exempt status would make NFPs the most likely acquirers of high cost facilities. Therefore, high cost FPs would either close the facility or sell the facility to a NFP while high cost NFPs were unlikely to convert to FP.

Although high cost facilities were adversely affected by the PPS, facilities with costs below the PPS reimbursement rate benefited from its implementation. Low cost facilities were able to make profits. Consequently, low cost FPs had little incentive to convert to NFP. However, low cost NFPs would generate profits that had to be reinvested in the mission of the organization. If the potential profits of a NFP were large enough, the facility could have the incentive to convert to a FP either through sale of the facility to a FP or a formal change in the corporate charter. The conversion would permit shareholders to extract these increased rents. But the NFP to FP conversion process is often more difficult than conversion from FP to NFP because resources are needed to transform the mission of the organization and obtain regulatory approval.ⁱⁱⁱ Therefore, variations in the NFP to FP conversion rate are likely to be determined by the cost structure of the facility and the preference of local regulatory authorities for FP enterprises in the production of health care.

3. Empirical Method

The primary focus of this paper is to determine the effect of conversion on nursing home quality.

The production function for nursing home quality is given by

$$Q_{it} = \alpha_1 NFP_{it} + \alpha_2 FP_{it} + \alpha_3 X_{it} + t \cdot (\delta_0 + \delta_1 NFP99_i + \delta_2 W99_i) + c_i + u_{it}$$

where Q_{it} is a quality measure for nursing home i in period t . The dummy variables NFP_{it} and FP_{it} indicate ownership status and act as an intercept. The variable X_{it} is a vector of time-varying exogenous variables. Both $NFP99_i$ and $W99_i$ are interacted with the time trend t and capture how facility characteristics in 1999 affected the trend in quality after the implementation of the PPS. The variable $NFP99_i$ is an indicator for NFP ownership in 1999 and $W99_i$ is vector of observable facility and market characteristics in 1999. Finally, the variable c_i includes observable and unobservable time-constant factors while u_{it} is an error term.

In order to handle the unobserved individual specific effects the model is estimated as the first difference of the years 2004 and 1999. The first differenced quality production function becomes

$$\Delta Q_i = \alpha_1 \Delta NFP_i + \alpha_2 \Delta FP_i + \alpha_3 \Delta X_i + (\delta_0 + \delta_1 NFP99_i + \delta_2 W99_i) + \Delta u_i.$$

This model defines the change in quality as a function of time varying inputs, ΔX , and fixed factors that were determined in 1999, $W99$. The variables of ΔNFP , ΔFP , and $NFP99$ jointly identify NFP to FP conversions, FP to NFP conversions, and NFPs that do not convert, respectively, with a reference group of FPs that do not convert. Therefore, in comparison to FPs that do not convert, the coefficient δ_1 is the change in quality of NFP that do not convert, $\alpha_1 + \delta_1$ is the change in quality of NFPs that convert, and α_2 is the change in quality of FPs that convert.

In the estimation of this quality production function, several issues must be addressed. Since conversions are likely to be endogenous, the estimation employs an instrumental variable procedure which uses the probability of conversion during the period as an instrument. The only endogenous ownership variables are the ones that represent conversion. The reason is because the BBA provides an exogenous shock that makes the initial ownership status in 1999 exogenous to the equilibrium under the PPS.

A second econometric issue is heteroscedasticity. A White (1980) test reveals the presence of heteroscedasticity in the quality model.^{iv} Heteroscedasticity is handled in the estimation through the utilization of a weighted form of instrumental variable estimation that employs a flexible estimator for the variance function to construct the weights.^v

The instrument used for each type of conversion in the quality model is the probability of conversion between 1999 and 2004. For both FPs and NFPs, managers made an initial assessment of their position in the market and their financial situation after the implementation of the PPS. One potential strategy was to convert even though managers had limited control over the specific date of conversion. If the conversion occurred because of a sale a purchaser needed to be identified. Alternatively, if the conversion was because of a change in the corporate charter, a new organizational structure needed to be established. Managers would make assessments to convert in 1999, however, the choice to convert is only observed for facilities that successfully converted. This can be written as a binary choice model:

$$D = \begin{cases} 1: & Z\beta_0 + c_0 > e \\ 0: & \text{Otherwise} \end{cases}, \quad e = [1 + s(Z\pi_0)]\varepsilon.$$

The variable D is equal to one if a facility converted by the end of 2004 and zero otherwise. The vector Z represents a set of exogenous variables in 1999. Further, at least one of the variables in the vector Z is an exclusion restriction. That is, there is a variable that significantly predicts the probability of conversion but not the quality of care.

A score test found the presence of heteroscedasticity the choice to convert.^{vi} One common approach is to multiple the random disturbance ε by a function of observable characteristics. Heteroscedasticity is allowed through the function s ; however, economic theory provides little, if any, guidance as to the specific function s and the distribution of the random disturbance ε . Therefore, the above model is estimated without parametric assumptions.^{vii} The estimation technique only identifies normalizations of the parameter estimates of β_0 and π . In this structure, β and π are unknown and it is not possible to identify how a change in the explanatory variable affects the probability of conversion solely

due to β or π . Nevertheless, the overall impact of the exogenous variables on the choice of conversion can be determined through calculation of the marginal effect.^{viii} Also, it should be noted that heteroscedasticity in the conversion model provides an additional source of identification from any exclusion restrictions.^{ix}

The factors that determine conversion for FPs and NFPs are similar, but the manner in which these factors enter into the decision to convert differ for each ownership status. Therefore, separate models are estimated for the choice of FPs to convert to NFP and NFPs to convert to FP. This is possible because the BBA provides a policy shock which allows initial ownership in 1999 to be treated as exogenous.

4. Data

The empirical model uses the Online Survey Certification and Reporting (OSCAR) system to examine the effect of the BBA on nursing home conversions and quality in the United States. OSCAR is extensively used to analyze nursing home quality and is a uniform database of state nursing home surveys. The nursing homes that provide care to Medicare or Medicaid residents are required to complete these surveys as part of the yearly re-certification processes. This certification process is used to determine if nursing homes are compliant with federal regulations (Harrington et. al., 2006). The surveys contain self-reported information on facility, quality, and aggregate resident characteristics for the 96% of certified facilities in the United States (Strahan, 1997). The surveys are completed with oversight of state agents every nine to fifteen months. Although the average length of time between surveys is twelve months some nursing home may not have completed a survey in all calendar years. Finally, validation studies have found that the information in OSCAR is a reliable source of information on nursing homes (Intrator et al., 2005; Harrington et al., 2006; Feng et al., 2005).

The OSCAR system was supplemented with data on policy, economic, and demographic characteristics of each facility's location. Addresses provided in OSCAR contain the ZIP code, county, and state of each facility. The urbanicity of each facility was identified at the ZIP code level by the

second version of the Rural-Urban Commuting Area Codes (RUCA) available through the WWAMI Rural Health Research Center (2007). Annual county level demographic data was obtained from the Bureau of Health Profession's Area Resource File (ARF). Annual state level data was obtained from several different sources. The American Hospital Association Hospital Statistics (2002) was the source of information on hospital ownership while minimum wage rate by state was obtained from the Tax Policy Center (2007). The Tax Foundation (2007a, 2007b) provided corporate tax rates and property tax per-capita. Finally, average Medicaid reimbursement rates came from Grabowski, Feng, et al., (2004) and Grabowski, Angelelli, and Mor (2004).

Study Sample

The study analyzes the determinants of conversion after the implementation of the BBA and the subsequent change in the quality of care for nursing homes privately owned between 1999 and 2004.^x The 14,316 non-governmental facilities which completed a survey in 1999 were matched with their corresponding survey for the year 2004. A facility was determined to have a survey in calendar year 2004 if a survey was completed between December 1, 2003 and January 30, 2005. Facilities that had gaps of more than two years between surveys or were located in the states of Hawaii or Alaska were excluded.^{xi} Additionally, eight facilities were excluded because the year of conversion could not be identified. The resulting sample with surveys for both 1999 and 2004 included 12,894 facilities.^{xii}

Similar to other researchers that used OSCAR to analyze quality, nursing homes with erroneous staffing levels were excluded (Banaszak-Holl et al., 2002; Harrington et al., 2006). In particular, some nursing homes either report no nursing staff or report numbers of nursing staff that are implausibly high. A two step process is used to limit the sample to facilities with consistent staffing levels. First, the facilities with no reported nursing staff and the facilities with staff levels of greater than 24 hours per resident day were identified and deleted from the sample. Of the remaining facilities, those with staff levels that were three standard deviations outside the sample mean were excluded. The final sample for analysis included 12,111 facilities.

Measuring Ownership and Conversions

OSCAR did not record conversions in ownership. However, OSCAR contained information that can be used to identify conversions. Each survey contained information on twelve different nursing home ownership structures which can be broadly classified as FP (corporation, individual, and partnership), NFP (church-related, corporation, and other), and government entities (city, city/county, county, federal, hospital district, and state). A conversion was defined as a nursing home that switched ownership status within a two year period. For example, if a nursing home was reported as one of the ownership structures identified as FP in year 2000 and as one of the ownership structures reported as NFP in 2001, then the nursing home would be designated as a facility that converted from FP to NFP in the year 2001.

Five percent of nursing homes converted between 1999 and 2004 (Table 1). Of the 8,698 FP facilities in 1999, 4.2% of the FPs converted to a NFP within five years of the implementation of PPS while 7% of NFPs converted to a FP. The highest number of conversions occurred in 2002. This corresponded with the full implementation of the PPS.

Quality Measures

An important dimension in empirical work is the choice of quality measures. Quality is multi-dimensional and the fact that a facility performs well in one measure does not mean that it performs correspondingly well in all others. Health care quality measures are chosen to incorporate outcomes and care processes that can directly be attributable to the facility.

Since nursing home quality is multidimensional, separate models were estimated for one substantive measure and two procedural measures. The substantive quality measure used in this analysis is the proportion of residents with pressure ulcers, sometimes referred to as bedsores. Pressure ulcers are erosions in the skin caused by a lack of blood supply to the skin or friction with the bed. Pressure ulcers are a substantive quality measure since they are preventable and treatable. The first procedural measure is the proportion of residents that are physically restrained. Physical restraint is a procedure of nursing care that can have substantial effects on the patient. For example, restraints are associated with lower dignity and the increased risk of physical harm and mental illness. In many cases, nursing homes may use restraints as a labor-saving mechanism, especially with residents that have been diagnosed with dementia.

Dementia is often associated with wandering and agitated behavior toward one's self or others. With over 45% of nursing home residents diagnosed with dementia, physical restraint of such residents can reduce the burden of nursing staff. The second procedural measure is the proportion of residents that are prescribed antipsychotic medication. Antipsychotics are used to treat psychosis (e.g. schizophrenia, mania, and delusions). Antipsychotics have the effect of sedating or "tranquilizing" the residents and may be a substitute for physical restraints. Recently, the safety of prescribing antipsychotic drugs to nursing home residents has been questioned. The Food and Drug Administration issued a black box warning on the use of antipsychotic medication by nursing home residents in 2005. The Food and Drug Administration specifically cites a recent meta-analysis that found that the use of antipsychotic medications in residents with dementia can lead to pre-mature death (Schneider et al., 2006). For all these measures a higher number is associated with lower quality.

Table 2 contains the summary statistics for NFPs, FPs, and the combined sample for years 1999 and 2004. NFPs had higher quality in 1999 and 2004, although both ownership statuses changed the quality of care in the same direction in the period. For the combined sample, an additional half percent of residents had a pressure ulcer while the proportion of residents physically restrained decreased by three and half percentage points. Interestingly, the number of residents that use antipsychotic medications increased drastically during the period. The percentage of residents prescribed antipsychotic drugs increased from 15.3 percent to 21.7 percent in NFP nursing homes from 1999 to 2004 while in FP nursing homes the percentage of residents increased from 20.7 percent to 29.1 percent.

Explanatory Variables

The quality of nursing home care is a function of organizational structure, revenue sources, market conditions, resident case-mix, and nursing staff levels. A facility's physical and corporate structure can influence the quality of care after the passage of the BBA. For example, facilities that were part of a corporate structure that operated multiple nursing homes may standardize care across their facilities. This could result in lower average quality than if care is tailored to the individual resident.

Other characteristics that affect the quality of care provided are the size of the facility, whether or not it was hospital-based, the presence of an Alzheimer's special care unit, and the occupancy rate.

The facility's revenue sources and market conditions determine the financial resources available to provide quality after the BBA. The revenue of a facility can vary with the primary payer of nursing home care for each resident. For example, the Medicaid program consistently paid low reimbursement rates, and previous studies have found that facilities more dependent on Medicaid provide a lower level of quality (Cohen and Spector, 1996; Grabowski, 2004). Resources available to the facility can further be determined by the level of market competition, urbanicity,^{xiii} Medicaid reimbursement rate,^{xiv} and demand for nursing care. The level of market competition was measured by a Hirschmann-Herfindahl index for the number of beds in the county.^{xv}

The physical dependence of the typical nursing home resident has steadily increased because assisted living facilities have become an alternative for healthier persons in need of long term care. Therefore, holding other things equal, facilities with residents that were less dependent on nursing staff could have higher quality. To account for this difference in physical case-mix, the Acuinex is included in the model. The Acuinex is a measure that incorporates the activities of daily living index (proportion of residents dependent in eating, toileting, transferring, and ambulation) and the proportion of residents that require special treatments (Cowles, 2002). The case-mix of cognitively impaired residents was measured by the proportion of residents with dementia and the proportion of residents with psychiatric conditions other than dementia and depression.

The final component that enters into a facility's quality decision was nursing staff. Staffing is a mechanism that can directly affect the health outcomes of nursing home residents. Facilities are required to maintain a minimum level of nursing staff by law and most facilities have staff levels close to this legal requirement. Further, nursing homes have some discretion over the composition of nursing staff, which results in different cost structures. For example, registered nurses are the most expensive type of nursing staff while certified nurse aides are paid near minimum wage. Facilities could adjust staff composition to alter quality and reduce costs. Since facilities that convert could change staff levels more than facilities

that do not convert, the inclusion of staff variables could underestimate the effect of ownership conversion on the quality of care. Therefore, the quality models were estimated as reduced form equations without staff variables. Robustness checks were performed that included staffing variables in the regression models. All staffing levels were measured in terms of hours per resident day (HPRD) to standardize across facilities of various sizes.

The factors that determined the probability of conversion after the implementation of the BBA can be classified as the cost structure of the facility, the exposure to the PPS, and the regulatory environment. Since the process of conversion required time, these factors are measured as of 1999 when the facilities first confronted the impact of the BBA.

The variables that determine the probability of conversion and are uncorrelated with quality are taxes, median gross rent, growth in proportion of FP hospitals, and Medicare managed care penetration rate. First, fixed costs affect the profitability of firms but do not affect the profit-maximizing quality and quantity decisions. Median gross rent in the county and property taxes are two fixed costs used in the regressions. Second, state corporate taxes are charged on firm profits but are not expected to be correlated with quality. Therefore, the highest state corporate tax rate is included in the model. Third, regulators have the ability to restrict entry and exit from the local health care market. Therefore, regulators have the ability to influence the conversion rate of nursing homes. This rate is correlated with the preference of regulators for FPs in the production of health care. Regulator preference is captured by the growth in proportion of FP hospitals in the state. Since hospitals and nursing homes do not directly compete, the increase in FP hospitals is uncorrelated with changes in the quality of nursing home care. Rather they are correlated with regulator willingness to allow FPs to enter the market. The final instrumental variable is the Medicare managed care penetration rate. Managed care entities use cost containment mechanisms to reduce costs. In counties with higher Medicare managed care penetration rates, facilities were more likely to be under financial pressure from cost containment mechanisms. Further, these facilities may be disproportionately impacted by the PPS. Since managed care was well

established prior to the passage of the BBA, any correlation with quality and the managed care penetration rate would have occurred prior to 1999.

5. Results

Probability of Conversion

Separate models for facilities that were NFP and FP in 1999 are estimated to determine the probability of conversion. Marginal effects for the probability of conversion along with their standard errors and t-statistics are reported in Table 3.

NFP facilities that were hospital-based and in high tax states were less likely to convert although only the hospital-based marginal effect was statistically significant. These marginal effects are consistent with the hypothesis that low cost NFPs convert to take advantage of market opportunities. It also reflects the use of conversion to extract profits from the nursing home. Facilities with greater exposure to the public revenue sources of Medicare and Medicaid had higher probabilities of conversion. As expected, facilities in less competitive markets and in states where regulators had weaker preferences for FPs in the production of health care had a lower probability of conversion. This reflects the regulatory burden in the ability of NFPs to convert.

The marginal effects are also consistent with FP divestiture of the highest cost facilities. First, the positive marginal effects for tax rates indicate conversion to the tax-exempt NFP status was more attractive in higher tax jurisdictions. Second, facilities in states with higher minimum wage and higher rental expenses were more likely to convert to NFP. Third, nursing staff levels had an effect on the probability of conversion. Facilities that used more registered nurses and therapy staff were associated with an increase in the probability of conversion to a NFP. In contrast, licensed practical nurses reduced the probability of conversion. The results for registered nurse and licensed practical nurse staff are consistent with high cost facilities being under greater financial pressure. Since most FPs already had staffing levels close to the legal limits, many facilities were unable to substitute registered nurses for less costly licensed practical nurses. Further, the therapy staff result is consistent with the use of ancillary

services to increase profits because facilities using more ancillary services would require more therapy staff. Finally, an increase in the growth of FP hospitals translated into a higher probability of conversion and may reflect facilities that previously converted from NFP to FP converted prior to the passage of the BBA.

The variables of median gross rent, taxes, growth in FP hospitals, and Medicare managed care penetration rate were the exclusion restrictions that identified the quality model. Tests found that these exclusion restrictions significantly explained the probability of conversion. Tests for joint significance of the normalized parameter estimates of β and π reveal that the exclusion restrictions are significantly different from zero for the FP sample (F-statistic = 32.9, p-value < 0.001) and for the NFP sample (F-statistic = 104.18, p-value < 0.001). Further, individual t-tests on the normalized parameter estimates were performed. For both the FP and the NFP sample, the coefficient estimates for each exclusion restriction were statistically significant for at least the one of the normalized parameters in either the index of $Z\beta_0$ or $Z\pi_0$ (data not shown).

The Effects of Conversions on the Quality of Care

The second part of the analysis was to determine the effect of conversions on the quality of care provided by nursing homes. Summary statistics (Table 2) find there is significant variation between NFP and FP facilities in staffing levels, organizational characteristics, payer-mix, and case-mix. Hausmann tests were performed to determine if the coefficients in the first differenced quality production function differ for FP and NFP facilities. The results suggest that production function is different depending on the initial ownership status. Therefore, separate models for facilities that were initially NFPs in 1999 and initially FPs in 1999 are estimated. These regressions are the primary focus of the discussion although the regression results of the pooled sample of FP and NFP facilities are reported in the tables.

The prevalence of pressure ulcers increased from 6.7% of residents in 1999 to 7.3% in 2004 (Table 2). NFPs started with higher quality in 1999 although quality decreased by 2004 for both NFP and FP facilities. The regressions suggest that the baseline comparison group of FPs that did not convert reduced quality, although the coefficient is not statistically significant (Table 4). The substantive finding

that emerges from Table 4 is that NFP facilities that did not convert experienced a reduction in quality compared to FP facilities that did not convert. The regression on the sample of NFP facilities in 1999 finds that the decrease in quality for facilities that did not convert corresponds to an approximately 1.5 percentage point increase in the proportion of residents with a pressure ulcer. Given the number of residents in NFP nursing homes, this constitutes an additional 4,725 residents with a pressure ulcer in 2004 compared to 1999. The result is robust to treatment of conversions as exogenous and endogenous. The decrease in quality associated with NFP facilities which did not convert is also found in the regression of the sample of all facilities. The significant increases in the proportion of residents with pressure ulcers in NFP facilities suggest a convergence in quality between NFP and FP facilities between 1999 and 2004.

In all the estimated models, NFP to FP conversion has no statistically significant effect on the percentage of residents with pressure ulcers. In the case of the FP sample, there was no effect of conversion in the exogenous model, but the instrumental variable model found a 1.75 percentage point increase in the proportion of residents with pressure ulcers in facilities which converted from a FP to a NFP. This result is marginally significant. The finding that facilities that convert from FP to NFP reduce quality can be attributed to a similar resource problem that affected NFPs that did not convert. These facilities were more likely to have costs that were higher than the new PPS reimbursement rate, and through cost cutting measures and the tax advantages of NFP ownership, were able minimize losses. Thus, high cost FPs were more likely to admit residents who required special needs to fill beds and improve the attractiveness of the facility to a NFP sponsor. This caused facilities that converted from FP to NFP to have a higher proportion of residents with pressure ulcers in 1999. It is also a reason that the failure to account for the endogeneity of conversion leads to underestimate of the effect of conversion on quality.

The other control variables had effects similar to those found in other papers that study nursing home quality measures. Further, the instrumental variable model did not significantly change the effects of these control variables. Facilities that were members of organizations that operate multiple facilities

had lower proportions of residents with pressure ulcers. This suggests that chains employed standardized care processes that could better identify and treat potential pressure ulcers. However, the effect was only significant for FP chains. As expected, facilities with more physically dependent residents had a higher incidence of pressure ulcers. Competition forced facilities to provide higher quality to attract new residents to the facility although the effect was only significant for FPs. This may suggest that FPs had optimally chosen quality unique to their perceived market. Further, quality was responsive to Medicaid reimbursement, though the effect was only significant for NFPs and small in magnitude. A \$10 increase in Medicaid reimbursement per day was associated with a 0.20 percentage point reduction in the proportion of residents with pressure ulcers in NFP facilities.

The use of physical restraints declined by 3.6 percentage points for the entire sample (Table 2), but after adjustments for changes in other variables the proportion of residents that were physically restrained declined by five to six percentage points between 1999 and 2004 (Table 5). The overall decrease in the use of restraints by all ownership statuses was consistent with the efforts by government agencies and other groups to reduce the use of physical restraints. Across all samples there was a significant difference between the results from the exogenous and instrumental variable models.

The exogenous model for the NFP facility sample finds NFPs which did not convert reduced the use of restraints by 6.7 percentage points, while those NFP facilities that converted to a FP reduced restraints by 6.4 percentage points. The instrumental variable model finds a different effect. NFPs that do not convert reduced the use of restraints by 6.3 percentage points, while NFP to FP conversions were associated with a 9.9 percentage point reduction in physical restraints compared to the NFPs that did not convert. For the 273 NFP facilities that converted to FP, the additional reduction in the use of physical restraints of 3.6 percentage points corresponds to 1,200 residents or 4.34 residents per facility. One explanation for this result is that low cost NFPs could have case-mixes that made it easier for FPs to reduce the use of restraints which made them attractive to convert to a FP enterprise. In contrast, the effect of FP to NFP conversions was a 1.87 percentage points increase in the use of restraints compared to non-converted FPs but the result is not statistically significant.

Unlike the pressure ulcer quality measure, there was a significant increase in the use of physical restraints associated with nursing homes in multi-facility organizations, the effect being found in both FPs and NFPs. The higher the proportion of residents with dementia or psychiatric disorder the more physical restraints were used. This is because persons with mental disorders in nursing homes are often less physically dependent and their mental health conditions can be associated with wandering and aggression toward the staff, other residents, or themselves. The Medicaid reimbursement and minimum wage rates were associated with reduced use of physical restraints. Similar to the pressure ulcers measure, the effect the Medicaid reimbursement rate was small. The effect of the minimum wage could capture two separate effects. Since CNAs were often paid the minimum wage, a higher minimum wage could be associated with staff that is more motivated to provide high quality of care. But more likely, states that raised the minimum wage also had well-developed health advocacy networks which pressured state regulators to reduce the use of physical restraints.

There are several reasons why all facilities reduced the use of restraints over the period. First, regulators and public advocacy groups had pressured nursing homes to use fewer physical restraints. Second, the use of physical restraints was an observable quality that consumers could use to verify quality. Low levels of restraint are a strategy facilities can use to attract the higher per diem rates associated with private pay residents. Third, residents who are physically restrained cost more in staff time (Phillips and Fries, 1993) and a reduction in restraints could allow facilities to employ lower staff levels to reduce costs. Fourth, FP nursing homes may be more effective in the provision of care to residents with mental health needs without the use of physical restraints and implemented strategies to admit residents with lower cognitive ability (Table 2). The final reason for the trend is the substitution of physical restraints with chemical restraints because of the perceived efficacy of the new second generation of antipsychotic medication introduced in the study period.

Adjusting for psychiatric illness, physical restraints decreased by a rate nearly equivalent to the increase in antipsychotic drug use. The increase in use of antipsychotic medication among nursing home residents was 7.8 percentage points. This coincided with a 3.6 percentage point decrease in use of

physical restraints and 5.5 percentage point increase in residents with psychiatric conditions. Nursing homes may have substituted the use of physical restraints for “chemical restraints.” The second generation of antipsychotic medications that became available in this period were perceived to have fewer side-effects than the available predecessors. Facilities would have the incentive to reduce the use of physical restraints because they were easily verifiable by potential consumers without the use of medical records. Further, antipsychotic medications act as restraints by sedating the resident and may be a costless input to the nursing home if the resident’s medical insurance covered the cost of the drugs. Finally, the use of antipsychotic medication was not reported in public reports on nursing home quality, such as the Nursing Home Compare website.

The potential substitution of physical with chemical restraints is plausible given the results of the regressions that used antipsychotic medication as a quality measure (Table 6). In both the FP and NFP samples, the subsequent increase in the proportion of residents prescribed antipsychotic medications was approximately eight percentage points. This corresponds to a 38% increase in use of antipsychotic drugs for FP facilities and a 50% increase in use for NFP facilities. In other words, approximately 110,000 more nursing home residents received an antipsychotic drug in 2004 compared to 1999. For those facilities that were NFP in 1999, the regressions for the sample of all facilities found the change in the proportion of residents prescribed antipsychotic medications was 1.06 percentage points lower than FP facilities in 1999. In all models, both types of conversions were not associated with a statistically significant change in antipsychotic drug use compared to facilities that did not convert. Further, there existed some variation in the models accounting for the endogeneity of conversion but they did not substantially change the findings.

As found in the other quality measures, multi-facility organizations were significantly associated with quality. There was a positive and statistically significant association between the use of antipsychotic drugs and multi-facility organization if the facility was a FP. NFPs had a similar magnitude associated with multi-facility organizations but the result was not statistically significant. As expected, facilities with more cognitively impaired residents had higher utilization of antipsychotic medications. A

ten percentage point increase in the proportion of residents with a psychiatric condition resulted in a 1.18 percentage point increase in the proportion of residents that were prescribed antipsychotic drugs. The result reflects the fact that not all psychiatric conditions require the use of antipsychotic medications. The relationship between mental illness and antipsychotic drug uses requires further investigation with resident level data. Rural NFP nursing homes were found to have a greater proportion of residents prescribed antipsychotic drugs and may suggest the existence of an urban-rural disparity in the quality of nursing home care. Similar to the pressure ulcer quality measure, an increase in the rate of Medicaid reimbursement reduced the use of antipsychotic drugs although NFPs were more responsive to reimbursement changes.

Robustness Checks

In the previous regressions, the quality models were estimated without staff controls. Ownership conversions may lead to changes in staff levels because staffing is a mechanism that facilities could use after conversion to change the level of quality. Therefore, staffing levels are likely to be endogenous and the inclusion of staff levels could underestimate the effect of ownership conversion on the quality of care.

To determine if the results were robust with respect to changes in staff levels, the quality models were estimated with staffing variables as controls. Direct care staff was divided into four types: registered nurses, licensed practical nurses, certified nurse aids, and occupational/rehabilitative therapy staff. The average amount of contact time with each resident was measured in terms of hours per resident day so as to standardize across facilities of different sizes. Additionally, the proportion of hours of licensed nursing (registered nurses and licensed practical nurses) that were employed through contracts with third-parties was included in the regressions.

Table 7 reports the instrumental variable results for the ownership variables when staff variables are and are not included in regressions for the three quality measures. The inclusion of staffing controls does not change the direction or the significance of the ownership variables except in one case. For pressure ulcers, the effect of conversion from a FP to NFP becomes insignificant. Although staff levels do not significantly impact the effect of conversion, there can be other staffing factors not available in

OSCAR that may affect quality, such as staff turnover rates. Further, the impact of staffing on the quality of care provided had mixed results with many staffing variables having no significant effect. This may suggest that higher staffing levels do not directly translate into higher quality of care.

A second concern is that nursing homes may admit patients with certain medical conditions. Since many nursing home residents were admitted to the nursing home through hospitals, many of these residents could have had pre-existing pressure ulcers or orders for restraints. Therefore, there is a possibility that the effect of ownership conversion on quality was caused by a systematic difference in the admission of patients with pre-existing conditions. As a robustness check the quality measures for pressure ulcers and physical restraints were redefined as the proportion of residents with facility acquired pressure ulcers and facility acquired physical restraints.^{xvi} The signs and significance of the coefficients for these quality models were consistent with the previous definitions of the quality measures (Table 8).

6. Conclusion

Medical facilities are dependent on government reimbursement for a large share of their revenues and facility response to reimbursement changes have been found to vary with ownership status (Duggan, 2002). The empirical results suggest that significant changes to reimbursement rules that are meant to increase efficiency, such as those instituted by the BBA, can change incentives for firms and influence the relative mix of FPs and NFPs. Approximately five percent of nursing homes underwent an ownership conversion within five years of the introduction of the PPS. Further, low cost NFPs converted to FP to extract financial benefits provided by the reimbursement change while high cost FPs divested facilities to NFPs to limit losses. This and other reimbursement changes can effectively force NFPs and FPs to face similar incentives (Nelson, 1997). This could be one reason why the quality of care provided by the two ownership statuses has narrowed in the past few decades (Frank and Salkever, 2000; Sloan, 1998). Facilities converted from FP to NFP and NFP to FP significantly changed quality from 1999 to 2004. NFP to FP conversion were found to be associated with a decrease in use of physical restraints while

conversions from FP to NFP were associated with an increase in the proportion of residents with pressure ulcers.

The substantive finding of this study is that the quality of care provided by nursing homes has significantly changed since 1999. Since the implementation of the BBA certain nursing facilities increased the use of antipsychotic medications and instituted care practices which resulted in a greater proportion of residents with pressure ulcers. Nursing facilities that change ownership status have an incentive to change the quality of care because residents and family members are unable to monitor the quality on a daily basis. More information provided by the government or other third parties is one way families can combat their inability to monitor quality.

For example, government regulators have implemented multiple oversight mechanisms to protect residents and provide information about quality to potential consumers of nursing homes. First, regulators require facilities to fill out assessments on individual residents on a continuous basis. Second, facilities are re-certified for Medicare and Medicaid yearly and poor quality can result in de-certification. Third, the launch of the Nursing Home Compare website provides the public with reports on the quality of care provided in each nursing home certified for Medicare and Medicaid. Despite the efforts of the government to monitor quality and provide more information to consumers, the reduction in the quality of care provided to nursing home residents since 1999 is quite large. As shown above, from 1999 to 2004 there was a 6.4% increase the proportion of residents with a pressure ulcer and a greater than 40% increase in the proportion of residents prescribed antipsychotic medications.

The sizable change in the quality of care since the implementation of the PPS can be partially attributed to deficiencies in the current oversight mechanisms used by regulators. Many of the mechanisms currently in place focus on yearly changes or the comparison of facilities over a short time horizon. If current quality is not compared to historical levels, regulators and consumers could be unaware of long-run changes in quality, especially after a nursing home conversion.

In summation, differences still exist between NFPs and FPs even if they have similar responses to policies. Each ownership status has distinct economic advantages and disadvantages. Consequently, new

regulations will have a varied affect on strategies implemented for each ownership status. This study found the relative size of the quality change in facilities that convert can be large. Regulators need to be aware of long run changes in quality in all nursing homes and oversight mechanisms need to incorporate historical quality levels. Further, it is important to know how facilities respond through changes to private pay prices or access, but this would require additional data not available in OSCAR. There is a definite need for further research and vigilance of regulators to provide oversight of nursing homes conversion. This is particularly important as the baby-boomers age. It is predicted that close to 46% of them will use a nursing home once in their lifetimes (Spillman and Lubitz, 2002).

References

- Angelelli, J.J., Wilber, K.H., and Myrtle, R. "A comparison of skilled nursing facility rehabilitation treatment and outcomes under Medicare managed care and Medicare fee-for-service reimbursement." *The Gerontologist*, Vol. 40 (2000), pp. 646-653.
- American Hospital Association. *American Hospital Association Hospital Statistics, 2007 Edition*. Health Forum LLC, Chicago, IL, 2007.
- Banaszak-Holl, J., Berta, W.B., Bowman, D.M., Baum, J.A.C., and Mitchell, W. "The rise of human service chains: antecedents to acquisitions and their effects on the quality of care in US nursing homes." *Managerial and Decision Economics*, Vol. 23 (2002), pp. 261-282.
- BDO Seidman, LLP. *A report on shortfalls in Medicaid funding for nursing home care*. Available at <http://www.ahca.org/brief/seidmanstudy0312.pdf>, 2005.
- Brody, E. "The legal framework for nonprofit organizations. In W.W. Powell and R. Steinberg, Eds., *The Non-profit Sector: A Research Handbook, Second Edition*, edited by Powell WW and Steinberg R. New Haven, Yale University Press, 2006.
- Cohen, J.W. and Spector, W.D. "The effect of Medicaid reimbursement on quality of care in nursing homes." *Journal of Health Economics*, Vol. 15 (1996), pp. 23-48.
- Cowles, C.M. *Nursing Home Statistical Yearbook*. Montgomery Village, MD, Cowles Research Group, 2002.
- Davis, M.A. "On nursing home quality: A review and analysis." *Medical Care Review*, Vol. 48 (1991), pp. 129-66.
- Duggan, M. "Hospital market structure and the behavior of not-for-profit hospitals. *RAND Journal of Economics*, Vol. 33 (2002), pp. 433-446.
- Dummit, L.A. *Nursing homes: Aggregate Medicare payments are adequate despite bankruptcies*. Washington, DC, GAO, 2000.
- Farsi, M. "Changes in hospital quality after conversion in ownership status." *International Journal of Health Care Finance and Economics*, Vol. 4 (2004), pp. 211-230.
- Feng, Z., Katz, P.R., Intrator, O., Karuza, J. and Mor, V. "Physician and nursing staffing in nursing homes: the role and limitations of the Online Survey Certification and Reporting (OSCAR) System." *Journal of the American Medical Directors Association*, Vol. 6 (2005), pp. 27-33.
- Frank, R.G. and Salkever, D.S. "Market forces, diversification of activity, and the mission of not-for-profit hospitals." In D.M. Cutler, ed., *The Changing Hospital Industry: Comparing Not-for-profit and For-profit Institutions*. Chicago, Ill., University of Chicago Press, 2000.

- Grabowski, D.C. "A longitudinal study of Medicaid payment, private-pay price and nursing home quality." *International Journal of Health Care Finance and Economics*, Vol. 4 (2004), pp. 5-26.
- Grabowski, D.C., Angelelli, J.J. and Mor, V. "Medicaid payment and risk-adjusted nursing home quality measures." *Health Affairs*, Vol. 23(2004), pp. 243-52.
- Grabowski, D.C., Feng, Z., Intrator, O. and Mor, V. "Recent trends in state nursing home payment policies." *Health Affairs*, Vol. W4 (2004), pp. 363-73.
- Grabowski, D.C. and Hirth, R.A. 2003. "Competitive spillovers across non-profit and for-profit nursing homes." *Journal of Health Economics*, Vol. 22 (2003), pp. 1-22.
- Grabowski, D.C. and Stevenson, D.G. "Ownership conversions and nursing home performance." *Health Services Research*, forthcoming.
- Hansmann, H.B. "The role of the nonprofit enterprise." *The Yale Law Journal*, Vol. 89 (1980), pp. 832-901.
- Harrington, C., Carrillo, H. and LaCava, C. *Nursing Facilities, Staffing, Residents, and Facility Deficiencies, 1999 Through 2005*. San Francisco, CA, Department of Social and Behavioral Sciences, University of California, 2006.
- Hillmer, M.P., Wodchis, W.P., Gill, S.S., Anderson, G.M. and Rochon, P.A. "Nursing home profit status and quality of care: Is there any association?" *Medical Care Research and Review*, Vol. 62 (2005), pp. 139-166.
- Hirth, R.A. "Consumer information and competition between nonprofit and for-profit nursing homes." *Journal of Health Economics*, Vol. 18 (1999), pp. 219-240.
- Ichimura, H. "Semiparametric least squares (SLS) and weighted SLS estimation of single index models." *Journal of Econometrics*, Vol. 58 (1993), pp. 71-120.
- Ichimura, H. and Lee, L. 1991. "Semiparametric least squares estimation of multiple index models: single equation estimation." In W. Barnett W, J. Powell and G.E. Tauchen, eds., *Nonparametric and semiparametric methods in econometrics and statistics*. Cambridge, Cambridge University Press, 1993.
- Intrator, O., Feng, Z., Mor, V., Gifford, D., Bourbonniere, M. and Zinn, J. "The employment of nurse practitioners and physician assistants in US nursing homes." *Gerontologist*, Vol. 45 (2005), pp. 486-495.
- Jensen, M.C. and Ruback, R.S. "The market for corporate control." *Journal of Financial Economics*, Vol. 11 (1983), pp. 5-50.
- Keller, E.B., Melnick, G., and Zwanziger, J. "The changing effects of competition on non-profit and for-profit hospital pricing behavior." *Journal of Health Economics*, Vol. 18 (1999), pp. 69-86.
- Kessler, D.P. and McClellan, M.B. "The effects of hospital ownership on medical productivity." *RAND Journal of Economics*, Vol. 33 (2002), pp. 488-506.
- Klein, R.W. and Vella, F. "A semiparametric model for binary response and continuous outcomes under index heteroscedasticity." Working paper, 2006.
- Klein, R.W. and Spady, R.H. 1993. "An efficient semiparametric estimator for binary response models." *Econometrica*, Vol. 61 (1993), pp. 387-421.
- Konetzka, R.T., Yi, D., Norton, E.C., and Kilpatrick, K.E. 2004. "Effects of Medicare payment changes on nursing home staffing and deficiencies." *Health Services Research*, Vol. 39 (2004), pp. 463-488.
- Konetzka, R.T., Norton, E.C., Sloan, P.D., and Kilpatrick, K.E. "Medicare prospective payment and quality of care for long-stay nursing facility residents." *Medical Care* Vol. 44 (2006), pp. 270-276.
- Medicare Payment Advisory Commission (Medpac). *A data book: Healthcare spending and the Medicare program*. Washington, DC, Medpac, 2003.
- Nelson, H. *Not-for-profit and for-profit HMOs: converging practices but different goals?* New York, Milbank Memorial Fund, 1997.
- Newey, W.K. and McFadden, D.L. "Large sample estimation and hypothesis testing." In R.F. Engle, D.L. McFadden, and D.M. Cutler, eds., *Handbook of Econometrics, Volume 4*. Elsevier, 1994.

- Pagan, A. and Vella, F. "Diagnostic tests for models based on individual data: a survey." *Journal of Applied Econometrics*, Vol. 4 (1989), pp. S29-S59.
- Phillips, C.D. and Fries, B.E. "Reducing the use of physical restraints in nursing homes: will it increase costs?" *American Journal of Public Health*, Vol. 83 (1993), pp. 342-348.
- Picone, G., Chou, S., and Sloan, F. "Are for-profit hospital conversions harmful to patients and to Medicare?" *RAND Journal of Economics*, Vol. 33 (2002), pp. 507-523.
- Rhoades, J.A. and Krauss, N.A. *Chartbook #3: Nursing Home Trends, 1987 and 1996*. Agency for Healthcare Research and Quality, Rockville, MD., 1993.
- Rosenau, P.V. and Linder, S.H. 2003. "Two decades of research comparing for-profit and nonprofit health provider performance in the United States." *Social Science Quarterly*, Vol. 84 (2003), pp. 219-241.
- Schlesinger, M. and Gray, B.H. "How nonprofits matter in American medicine, and what to do about it." *Health Affairs*, Vol. 25 (2006a), pp. 287-303.
- Schlesinger, M. and Gray, B.H. "Nonprofit organization and health care: some paradoxes of persistent scrutiny." In W.W. Powell and R. Steinberg, Eds., *The Non-profit Sector: A Research Handbook, Second Edition*, edited by Powell WW and Steinberg R. New Haven, Yale University Press, 2006b.
- Shen, Y. "The effect of hospital ownership choice on patient outcomes after treatment for acute myocardial infarction." *Journal of Health Economics*, Vol. 21 (2002), pp. 901-922.
- Sloan, F.A. "Commercialism in nonprofit hospitals." *Journal of Policy Analysis and Management*, Vol. 17 (1998), pp. 234-252.
- Schneider, L.S., Tariot, P.N., Dagerman, K.S. et al. "Effectiveness of atypical antipsychotic drugs in patients with Alzheimer's disease." *New England Journal of Medicine*, Vol. 35 (2006), pp. 1525-38.
- Spillman, B.C. and Lubitz, J. "New estimates of lifetime nursing home use: have patterns of use changed?" *Medical Care*, Vol. 40 (2002), pp. 965- 975.
- Steinberg, R. "Economic theories of nonprofit organizations." In W.W. Powell and R. Steinberg, Eds., *The Non-profit Sector: A Research Handbook, Second Edition*, edited by Powell WW and Steinberg R. New Haven, Yale University Press, 2006.
- Strahan, G. "An overview of nursing homes and their current residents: Data from the 1995 National Nursing Home Survey." *Advanced Data for Vital and Health Statistics No. 280*. Hyattsville, MD, National Center for Health Statistics., 1997.
- The Tax Foundation. "State Corporate Income Tax Rates, 1999-2006." Available at <http://www.taxfoundation.org/files/statecorpincometaxrates-20070125.xls>, 2007a.
- The Tax Foundation. "Change in Per Capita State and Local Property Taxes." Available at <http://www.taxfoundation.org/research/show/22403.html>, 2007b.
- Tax Policy Center. "State minimum wage rates, 1983-2007." Available at <http://www.taxpolicycenter.org/taxfacts/displayafact.cfm?Docid=357>, 2007.
- Troyer, J.L. "Cross-subsidization in nursing homes: Explaining rate differentials among payer types." *Southern Economic Journal*, Vol. 68 (2002), pp. 750-773.
- Unruh, L., Zhang, N.J. and Wan, T.T.H. "The impact of Medicare reimbursement changes on staffing and the quality of care in nursing homes." *International Journal of Public Policy*, Vol. 1(2006), pp. 421-434.
- United States General Accounting Office (GAO). *Skilled Nursing Facilities: Medicare Payment Changes Require Provider Adjustment But Maintain Access*. Washington, DC, GAO, 1999.
- United States General Accounting Office (GAO). *Skilled Nursing Facilities: Medicare Payments Exceed Costs for Most but Not All Facilities*. Washington, DC, GAO, 2002a.
- United States General Accounting Office (GAO). *Skilled Nursing Facilities: Providers Have Responded to Medicare Payment System by Changing Practices*. Washington, DC, GAO, 2002b.
- United States General Accounting Office (GAO). *Medicaid Nursing Home Payments: States' Payment Rates Largely Unaffected by Recent Fiscal Pressure*. Washington, DC, GAO, 2003.

- White, H. "A heteroskedasticity consistent covariance matrix estimator and a direct test for heteroskedasticity." *Econometrica*, Vol. 48 (1980), pp. 417-38.
- WWAMI Rural Health Research Center (RHRC), *Rural-Urban Commuting Area Codes*. Available at <http://depts.washington.edu/uwruca/index.html>, 2007.
- Zinn, J. "Market competition and the quality of nursing home care." *Journal of Health Politics Policy and Law*, Vol. 19(1994), pp. 555-82.

Table 1: Sample Size by Ownership Type		
	Sample Size	%
Non-converters:	11,506	95.0%
For-profit	8,330	68.8%
Not-for-profit	3,176	26.2%
Not-for-profit to for-profit	237	2.0%
Year 2000	30	0.2%
Year 2001	36	0.3%
Year 2002	76	0.6%
Year 2003	44	0.4%
Year 2004	51	0.4%
For-profit to not-for-profit:	368	3.0%
Year 2000	63	0.5%
Year 2001	72	0.6%
Year 2002	111	0.9%
Year 2003	69	0.6%
Year 2004	53	0.4%
Overall	12,111	100.0%

Table 2: Summary Statistics

	Not-For-Profits		For-profits		All facilities	
	1999	2004	1999	2004	1999	2004
Quality Measures						
% residents with pressure ulcers	6.43 <i>5.86</i>	7.24 <i>6.11</i>	6.82 <i>4.82</i>	7.32 <i>5.23</i>	6.71 <i>5.14</i>	7.30 <i>5.49</i>
% residents physically restrained	10.02 <i>12.71</i>	5.88 <i>8.97</i>	11.83 <i>12.84</i>	8.37 <i>9.09</i>	11.32 <i>12.83</i>	7.67 <i>9.13</i>
% residents using antipsychotics	15.31 <i>9.49</i>	21.66 <i>11.48</i>	20.68 <i>13.38</i>	29.12 <i>14.96</i>	19.17 <i>12.64</i>	27.01 <i>14.46</i>
Facility Characteristics						
Number of beds (10's)	11.24 <i>8.60</i>	--	11.24 <i>5.46</i>	--	11.24 <i>6.50</i>	--
Part of a multi-facility organization	0.39 <i>0.49</i>	--	0.67 <i>0.47</i>	--	0.59 <i>0.49</i>	--
Hospital-based	0.19 <i>0.40</i>	--	0.01 <i>0.09</i>	--	0.06 <i>0.24</i>	--
Alzheimer's special care unit	0.21 <i>0.41</i>	--	0.16 <i>0.36</i>	--	0.17 <i>0.38</i>	--
Occupancy rate	85.09 <i>17.64</i>	84.51 <i>17.97</i>	83.99 <i>15.05</i>	83.27 <i>14.87</i>	84.30 <i>15.83</i>	83.62 <i>15.82</i>
Care Staffing						
Registered nurse staff HPRD	0.57 <i>0.66</i>	0.53 <i>0.66</i>	0.32 <i>0.29</i>	0.27 <i>0.25</i>	0.39 <i>0.44</i>	0.34 <i>0.43</i>
Licensed practical nurse staff HPRD	0.71 <i>0.47</i>	0.76 <i>0.47</i>	0.65 <i>0.35</i>	0.71 <i>0.33</i>	0.67 <i>0.39</i>	0.72 <i>0.38</i>
Certified nurse aide staff HPRD	2.12 <i>0.67</i>	2.26 <i>0.71</i>	1.84 <i>0.61</i>	2.00 <i>0.65</i>	1.92 <i>0.64</i>	2.07 <i>0.68</i>
% of licensed nursing staff contracted	2.10 <i>6.69</i>	2.63 <i>7.13</i>	1.32 <i>5.79</i>	1.86 <i>6.69</i>	1.54 <i>6.07</i>	2.07 <i>6.83</i>
Therapy staff HPRD	0.17 <i>0.29</i>	0.19 <i>0.29</i>	0.10 <i>0.17</i>	0.13 <i>0.15</i>	0.12 <i>0.21</i>	0.15 <i>0.20</i>
Resident Mix						
% residents paying with Medicaid	53.28 <i>27.22</i>	53.35 <i>25.87</i>	69.14 <i>20.04</i>	68.06 <i>17.96</i>	64.67 <i>23.41</i>	63.92 <i>21.54</i>
% residents paying with Medicare	12.39 <i>21.94</i>	15.16 <i>21.47</i>	8.29 <i>10.41</i>	12.29 <i>10.96</i>	9.45 <i>14.73</i>	13.10 <i>14.76</i>
Acuity index	10.05 <i>1.68</i>	10.06 <i>1.62</i>	10.13 <i>1.55</i>	10.17 <i>1.48</i>	10.10 <i>1.58</i>	10.14 <i>1.53</i>
% residents with dementia	43.10 <i>19.60</i>	45.55 <i>20.47</i>	43.32 <i>17.86</i>	45.34 <i>17.84</i>	43.26 <i>18.37</i>	45.40 <i>18.62</i>
% resident with psychiatric disorder	10.82 <i>12.28</i>	14.88 <i>13.85</i>	15.67 <i>16.03</i>	21.92 <i>17.65</i>	14.30 <i>15.22</i>	19.94 <i>16.96</i>

Standard errors are in italics. Missing statistics are for variables that use 1999 level only in estimating the model. All dollar values are measured in 2004 dollars.

Table 2: Summary Statistics Continued

	Not-For-Profits		For-profits		All facilities	
	1999	2004	1999	2004	1999	2004
Community, Competition, and Policy						
Rural facility	0.37 <i>0.48</i>	--	0.35 <i>0.48</i>	--	0.35 <i>0.48</i>	--
Hirschmann-Herfindahl index	0.20 <i>0.23</i>	--	0.19 <i>0.23</i>	--	0.20 <i>0.23</i>	--
Five year change in % for-profit hospitals	0.47 <i>3.46</i>	--	0.68 <i>4.45</i>	--	0.62 <i>4.19</i>	--
Medicaid reimbursement rate	99.48 <i>26.31</i>	121.08 <i>23.91</i>	93.48 <i>24.59</i>	115.69 <i>22.10</i>	95.18 <i>25.23</i>	117.21 <i>22.75</i>
State minimum wage	5.58 <i>0.78</i>	5.26 <i>0.77</i>	5.55 <i>0.87</i>	5.37 <i>0.80</i>	5.56 <i>0.85</i>	5.34 <i>0.79</i>
Population aged 65+ (10,000's)	7.36 <i>14.59</i>	7.38 <i>14.51</i>	8.77 <i>18.38</i>	8.88 <i>18.34</i>	8.38 <i>17.40</i>	8.46 <i>17.36</i>
Five year change in population aged 65+	2.44 <i>7.31</i>	--	3.65 <i>7.71</i>	--	3.31 <i>7.62</i>	--
Per capita income (1,000's)	27.62 <i>7.27</i>	30.85 <i>9.19</i>	26.78 <i>6.67</i>	29.76 <i>8.15</i>	27.01 <i>6.86</i>	30.07 <i>8.47</i>
Five year change in per capita income	14.67 <i>7.48</i>	--	14.79 <i>7.02</i>	--	14.76 <i>7.16</i>	--
Medicare managed care penetration rate	13.59 <i>14.44</i>	--	14.48 <i>15.37</i>	--	14.23 <i>15.12</i>	--
Median gross rent (100's)	5.33 <i>1.43</i>	--	5.40 <i>1.45</i>	--	5.38 <i>1.45</i>	--
Taxes						
Corporate tax rate	7.63 <i>2.78</i>	--	6.66 <i>2.93</i>	--	6.93 <i>2.92</i>	--
Per capita property taxes levied (100's)	10.40 <i>3.14</i>	--	9.72 <i>3.35</i>	--	9.92 <i>3.31</i>	--
Region Variables						
Middle Atlantic	0.21 <i>0.41</i>	--	0.10 <i>0.29</i>	--	0.13 <i>0.33</i>	--
New England	0.06 <i>0.25</i>	--	0.07 <i>0.26</i>	--	0.07 <i>0.25</i>	--
Midwest	0.41 <i>0.49</i>	--	0.31 <i>0.46</i>	--	0.33 <i>0.47</i>	--
Rocky Mountain	0.04 <i>0.19</i>	--	0.04 <i>0.18</i>	--	0.04 <i>0.19</i>	--
Pacific	0.07 <i>0.25</i>	--	0.11 <i>0.31</i>	--	0.10 <i>0.30</i>	--

Standard errors are in italics. Missing statistics are for variables that use 1999 level only in estimating the model. All dollar values are measured in 2004 dollars.

Table 3: Conversion Model - Marginal Effects

	Not-for-profit			For-profit		
	Marginal Effect	Standard Error	T Statistic	Marginal Effect	Standard Error	T Statistic
Sample size	3,413			8,698		
Baseline Conversion Rate	0.0694			0.0423		
Facility Characteristics						
Number of beds (10's)	-0.0021	0.027	-0.381	-0.0057	0.005	-1.213
Part of a multi-facility organization	-0.0118	0.011	-1.113	0.0187	0.012	1.594
Hospital-based	-0.0304	0.016	-1.894*	0.0205	0.045	0.046
Alzheimer's special care unit	-0.0147	0.015	-0.953	0.0315	0.013	2.507**
Occupancy rate	-0.0304	0.013	-2.259**	0.0158	0.009	1.716*
Care Staffing						
Registered nurse staff HPRD	0.0026	0.008	0.3012	0.0160	0.006	2.656***
Licensed practical nurse staff HPRD	-0.0118	0.012	-1.016	-0.0057	0.003	-2.012**
Certified nurse aide staff HPRD	-0.0198	0.009	-2.118**	-0.0048	0.004	-1.226
% of licensed nursing staff contracted	0.1077	0.004	2.486**	-0.0028	0.002	-1.548
Therapy staff HPRD	0.0304	0.012	2.630***	0.0095	0.003	2.740***
Resident Mix						
% residents paying with Medicaid	0.0476	0.027	1.736*	0.0004	0.000	2.614***
% residents paying with Medicare	0.0263	0.016	1.693*	0.0004	0.004	0.113
Acuity index	0.0295	0.010	2.814***	-0.0030	0.001	-2.146**
% residents with dementia	-0.0052	0.002	-2.233***	0.0042	0.002	1.947**
% resident with psychiatric disorder	0.0072	0.002	2.596***	0.0001	0.001	0.006
Community, Competition, and Policy						
Rural facility	0.0153	0.011	1.431	0.0184	0.006	2.909***
Hirschmann-Herfindahl index	-0.0141	0.006	-2.557**	0.0082	0.004	0.1913
Five year change in % for-profit hospitals	0.0248	0.009	2.696***	0.0747	0.017	4.302***
Medicaid reimbursement rate	-0.0357	0.012	-2.875***	0.0374	0.011	3.515***
State minimum wage	0.0011	0.001	1.732*	0.0183	0.008	2.215**
Five year change in population aged 65+	-0.0075	0.006	-1.223	-0.0041	0.004	-0.991
Five year change in per capita income	-0.0083	0.004	-2.113**	0.0190	0.006	3.394***
Medicare managed care penetration rate	-0.0034	0.009	-0.377	0.0156	0.005	2.842***
Median gross rent (100's)	0.0029	0.008	0.355	0.0169	0.007	2.468**
Taxes						
Corporate tax rate	-0.0149	0.012	-1.222	0.0188	0.009	2.157**
Per capita property taxes levied (100's)	-0.0114	0.009	-1.223	0.0057	0.006	1.025
Region Variables						
Middle Atlantic	-0.0102	0.006	-1.643*	-0.0153	0.011	-1.415
New England	-0.0282	0.014	-2.006**	0.0037	0.013	0.278
Midwest	-0.0218	0.009	-2.516**	-0.0519	0.013	-3.848***
Rocky Mountain	-0.0458	0.015	-3.018***	-0.0187	0.041	-0.455
Pacific	-0.0162	0.012	-1.322	0.0006	0.019	0.033

Marginal effects reflect a standard deviation increase in the explanatory variable if continuous or a discrete change from 0 to 1 if a dummy variable. All marginal effects are evaluated at the means of the variables.

* P-value < 10%

** P-value < 5%

*** P-value < 1%

Table 4: Quality Model Results: Pressure Ulcers						
	Not-for-profits		For-profits		All facilities	
	Exogenous	IV	Exogenous	IV	Exogenous	IV
Time Trend Constant	1.078* 1.666	1.491*** 2.524	0.293 0.663	0.194 0.449	0.345 0.942	0.164 0.511
Ownership Variables						
Not-for-profit in 1999					0.299** 2.297	0.248* 1.711
Not-for-profit to for-profit conversion	0.258 0.568	-0.753 -0.886			0.376 0.832	0.066 0.082
For-profit to not-for-profit conversion			0.033 0.076	1.745* 1.939	-0.081 -0.183	0.926 1.001
Facility Characteristics						
Number of beds (10's)	0.025 1.631	0.015 1.277	0.003 0.246	0.006 0.465	0.019* 1.937	0.019*** 2.713
Part of a multi-facility organization	0.211 0.928	0.303 1.473	-0.252* -1.819	-0.321** -2.422	-0.132 -1.120	-0.202* -1.854
Hospital-based	0.349 0.848	0.384 1.161	-2.668* -1.821	-3.101*** -3.854	-0.105 -0.265	0.239 0.731
Alzheimer's special care unit	0.121 0.547	0.098 0.414	-0.246 -1.475	-0.325* -1.818	-0.142 -1.059	-0.132 -0.968
Occupancy rate	-0.014 -1.32	-0.011 -1.603	-0.015** -2.371	-0.012** -2.754	-0.014*** -2.639	-0.015*** -4.167
Resident Mix						
% residents paying with Medicaid	-0.005 -0.545	0.001 0.130	0.000 -0.004	0.001 0.139	-0.002 -0.331	0.001 0.196
% residents paying with Medicare	0.043*** 2.582	0.059*** 5.583	0.057*** 5.916	0.059*** 7.847	0.051*** 5.795	0.056*** 9.238
Acuity index	0.663*** 6.032	0.550*** 7.239	0.581*** 10.575	0.524*** 10.979	0.606*** 11.944	0.535*** 13.168
% residents with dementia	-0.009 -1.506	-0.009 -1.774	-0.013*** -3.758	-0.013*** -4.056	-0.012*** -4.016	-0.012*** -4.547
% resident with psychiatric disorder	-0.006 -0.870	-0.006 -1.024	-0.005 -1.103	-0.003 -0.934	-0.005 -1.322	-0.004 -1.291
Community, Competition, and Policy						
Rural facility	0.208 0.658	0.101 0.369	-0.054 -0.284	-0.019 -0.111	0.018 0.111	0.027 0.191
Hirschmann-Herfindahl index	0.157 0.271	-0.082 -0.152	0.913** 2.431	0.903** 2.566	0.664** 2.101	0.623** 2.120
Medicaid reimbursement rate	-0.024*** -2.119	-0.019*** -2.120	-0.003 -0.488	-0.003 -0.432	-0.009* -1.728	-0.006 -1.298
State minimum wage	0.222 0.935	0.313 1.621	-0.468*** -4.377	-0.496*** -5.004	-0.343*** -3.518	-0.335*** -3.954
Population aged 65+ (10,000's)	0.0147 1.143	0.011 0.991	-0.007 -1.335	-0.003 -0.755	-0.002 -0.515	-0.004 -0.848
Per capita income (1,000's)	-0.013 -0.763	-0.019 -1.135	-0.005 -0.416	-0.007 -0.582	-0.010 -0.959	-0.007 -0.760
Region Variables						
Middle Atlantic	-0.240 -0.621	-0.223 -0.697	0.529** 2.169	0.513** 2.111	0.268 1.292	0.256 1.344
New England	-0.508 -0.856	-0.357 -0.709	0.704** 2.374	0.828** 2.530	0.466* 1.748	0.659*** 2.618
Midwest	0.083 0.249	-0.028 -0.097	0.032 0.170	0.081 0.484	0.081 0.498	0.101 0.714
Rocky Mountain	-0.655 -1.041	-0.760 -1.376	0.105 0.264	0.492 1.461	-0.083 -0.249	0.249 0.945
Pacific	-0.357 -0.572	-0.946* -1.770	0.969*** 3.626	1.076*** 4.242	0.755*** 3.023	0.822*** 3.517
Statistics in italics are t-statistics.						
* P-value < 10%						
** P-value < 5%						
*** P-value < 1%						

Table 5: Quality Model Results: Physical Restraints						
	Not-for-profits		For-profits		All facilities	
	Exogenous	IV	Exogenous	IV	Exogenous	IV
Time Trend Constant	-6.663*** <i>-4.012</i>	-6.313*** <i>-4.661</i>	-4.953*** <i>-5.046</i>	-4.528*** <i>-4.841</i>	-5.23*** <i>-6.160</i>	-4.932*** <i>-6.681</i>
Ownership Variables						
Not-for-profit in 1999					-0.898*** <i>-2.971</i>	-0.286 <i>-0.922</i>
Not-for-profit to for-profit conversion	0.224 <i>0.228</i>	-3.624** <i>-2.056</i>			0.126 <i>0.129</i>	-4.576** <i>-2.508</i>
For-profit to not-for-profit conversion			-0.427 <i>-0.628</i>	1.869 <i>0.993</i>	-0.439 <i>-0.650</i>	0.278 <i>0.153</i>
Facility Characteristics						
Number of beds (10's)	-0.002 <i>-0.114</i>	0.013 <i>0.517</i>	-0.027 <i>-1.026</i>	-0.019 <i>-0.717</i>	-0.007 <i>-0.400</i>	0.012 <i>0.880</i>
Part of a multi-facility organization	1.324*** <i>0.870</i>	1.879*** <i>4.280</i>	1.796*** <i>5.732</i>	1.679*** <i>5.710</i>	1.678*** <i>6.530</i>	1.623*** <i>6.826</i>
Hospital-based	1.602 <i>1.178</i>	1.043* <i>1.950</i>	0.730 <i>0.575</i>	-0.926 <i>-0.665</i>	0.708 <i>1.406</i>	0.375 <i>0.790</i>
Alzheimer's special care unit	0.424 <i>0.871</i>	0.436 <i>0.812</i>	-0.076 <i>-0.196</i>	-0.110 <i>-0.295</i>	0.085 <i>0.277</i>	0.004 <i>0.014</i>
Occupancy rate	0.004 <i>0.278</i>	0.003 <i>0.200</i>	-0.020* <i>-1.704</i>	-0.023* <i>-2.445</i>	-0.013 <i>-1.425</i>	-0.017** <i>-2.261</i>
Resident Mix						
% residents paying with Medicaid	0.023 <i>1.097</i>	0.020 <i>1.288</i>	0.004 <i>0.307</i>	0.008 <i>0.811</i>	0.008 <i>0.783</i>	0.003 <i>0.382</i>
% residents paying with Medicare	-0.031 <i>-1.255</i>	-0.013 <i>-0.662</i>	-0.032* <i>-1.660</i>	-0.027* <i>-1.740</i>	-0.032** <i>-2.128</i>	-0.015 <i>-1.241</i>
Acuity index	0.831*** <i>4.632</i>	0.779*** <i>5.023</i>	0.665*** <i>5.831</i>	0.710*** <i>6.883</i>	0.728*** <i>7.620</i>	0.658*** <i>7.746</i>
% residents with dementia	0.002 <i>0.149</i>	-0.002 <i>-0.200</i>	0.018** <i>2.316</i>	0.017** <i>2.527</i>	0.014** <i>2.078</i>	0.013** <i>2.260</i>
% resident with psychiatric disorder	0.023 <i>1.530</i>	0.030** <i>2.188</i>	-0.003 <i>-0.305</i>	-0.003 <i>-0.379</i>	0.003 <i>0.436</i>	0.004 <i>0.665</i>
Community, Competition, and Policy						
Rural facility	-0.276 <i>-0.443</i>	-0.389 <i>-0.650</i>	-0.694* <i>-1.777</i>	-0.508 <i>-1.381</i>	-0.571* <i>-1.722</i>	-0.293 <i>-0.952</i>
Hirschmann-Herfindahl index	0.789 <i>0.592</i>	1.102 <i>0.945</i>	1.198 <i>1.540</i>	0.677 <i>0.932</i>	1.038 <i>1.538</i>	0.102 <i>0.162</i>
Medicaid reimbursement rate	-0.045** <i>-2.059</i>	-0.030 <i>-1.506</i>	-0.030** <i>-2.263</i>	-0.033** <i>-2.634</i>	-0.034*** <i>-3.018</i>	-0.026** <i>-2.504</i>
State minimum wage	-1.403*** <i>-2.656</i>	-1.502*** <i>-3.544</i>	-2.627*** <i>-10.337</i>	-2.478*** <i>-10.684</i>	-2.374*** <i>-10.379</i>	-2.101*** <i>-9.702</i>
Population aged 65+ (10,000's)	0.039* <i>1.947</i>	0.043** <i>2.386</i>	0.014 <i>1.303</i>	0.020 <i>1.973</i>	0.018* <i>1.893</i>	0.020** <i>2.369</i>
Per capita income (1,000's)	0.051 <i>0.957</i>	0.025 <i>0.653</i>	0.035 <i>1.282</i>	0.024 <i>0.870</i>	0.038 <i>1.486</i>	0.021 <i>1.003</i>
Region Variables						
Middle Atlantic	1.120 <i>1.585</i>	0.949 <i>1.394</i>	0.009 <i>0.017</i>	-0.298 <i>-0.586</i>	0.368 <i>0.900</i>	-0.085 <i>-0.215</i>
New England	0.494 <i>0.365</i>	0.111 <i>0.098</i>	0.741 <i>0.964</i>	0.446 <i>0.623</i>	0.700 <i>1.044</i>	0.268 <i>0.449</i>
Midwest	1.356** <i>2.179</i>	0.945 <i>1.558</i>	0.172 <i>0.476</i>	0.049 <i>0.138</i>	0.438 <i>1.404</i>	0.224 <i>0.751</i>
Rocky Mountain	-5.533*** <i>-3.418</i>	-5.607*** <i>-4.730</i>	-2.736*** <i>-3.470</i>	-2.778*** <i>-3.810</i>	-3.615*** <i>-4.966</i>	-3.217*** <i>-4.962</i>
Pacific	-1.451 <i>-0.857</i>	-1.475 <i>-1.235</i>	-1.480** <i>-2.352</i>	-1.379** <i>-2.360</i>	-1.448*** <i>-2.407</i>	-1.751*** <i>-3.014</i>
T-statistics in italics.						
* P-value < 10%						
** P-value < 5%						
*** P-value < 1%						

Table 6: Quality Model Results: Antipsychotic Medication						
	Not-for-profits		For-profits		All facilities	
	Exogenous	IV	Exogenous	IV	Exogenous	IV
Time Trend Constant	7.391*** 6.324	7.715*** 7.438	7.890*** 9.861	7.818*** 9.684	8.228*** 12.559	8.523*** 13.630
Ownership Variables						
Not-for-profit in 1999					-1.146*** -4.879	-1.059*** -3.941
Not-for-profit to for-profit conversion	0.332 0.473	0.943 0.691			0.228 0.331	0.026 0.018
For-profit to not-for-profit conversion			0.390 0.693	1.295 0.760	0.404 0.721	1.272 0.804
Facility Characteristics						
Number of beds (10's)	0.022 1.175	0.019 1.056	0.041* 1.661	0.046** 2.005	0.031* 1.954	0.029** 2.542
Part of a multi-facility organization	0.407 1.196	0.468 1.401	0.460* 1.797	0.620** 2.506	0.455** 2.201	0.499** 2.506
Hospital-based	-2.594*** -6.023	-2.694*** -6.512	-4.456*** -2.601	-3.154** -2.021	-2.687*** -6.339	-2.646*** -6.462
Alzheimer's special care unit	0.019 0.049	-0.047 -0.118	0.443 1.291	0.526 1.598	0.300 1.133	0.314 1.249
Occupancy rate	-0.016 -1.217	-0.017 -1.613	-0.006 -0.505	-0.012 -1.449	-0.007 -0.817	-0.013* -1.945
Resident Mix						
% residents paying with Medicaid	0.018 1.334	0.008 0.667	0.028*** 2.856	0.028*** 3.177	0.026*** 3.295	0.020*** 2.905
% residents paying with Medicare	-0.029 -1.549	-0.036 -2.352	-0.025* -1.693	-0.030* -2.379	-0.026** -2.239	-0.028*** -2.591
Acuity index	-0.113 -0.858	-0.119 -1.013	-0.652*** -5.714	-0.568*** -6.309	-0.502*** -5.559	-0.468*** -6.474
% residents with dementia	0.032*** 2.862	0.037*** 4.230	0.032*** 4.964	0.039*** 6.505	0.032*** 5.712	0.037*** 7.360
% resident with psychiatric disorder	0.099*** 8.615	0.096*** 9.203	0.138*** 14.733	0.121*** 17.006	0.129*** 16.864	0.117*** 19.524
Community, Competition, and Policy						
Rural facility	1.646*** 3.294	1.600*** 3.524	0.126 0.385	0.109 0.344	0.515* 1.887	0.439* 1.666
Hirschmann-Herfindahl index	-2.346** -2.482	-2.25** -2.416	-0.240 -0.361	-0.229 -0.349	-0.810 -1.480	-0.732 -1.381
Medicaid reimbursement rate	-0.025 -1.417	-0.709** -2.119	-0.045*** -4.106	-0.045*** -4.198	-0.040*** -4.249	-0.041*** -4.678
State minimum wage	-0.656* -1.867	-0.027* -1.711	-0.111 -0.562	-0.113 -0.606	-0.230 -1.328	-0.228 -1.329
Population aged 65+ (10,000's)	0.033*** 2.620	0.031*** 2.566	0.024*** 2.872	0.021*** 2.738	0.026*** 3.695	0.026*** 4.039
Per capita income (1,000's)	-0.017 -0.486	-0.027 -0.918	0.022 0.916	0.018 0.757	0.007 0.372	-0.003 -0.172
Region Variables						
Middle Atlantic	-1.322** -2.386	-1.160** -2.196	-1.352*** -3.010	-1.299*** -2.826	-1.322*** -3.849	-1.222*** -3.639
New England	-0.908 -0.976	-1.115 -1.265	-2.336*** -3.872	-2.310*** -3.913	-1.923*** -3.796	-1.864*** -3.790
Midwest	-1.391*** -2.901	-1.367*** -2.952	-1.074*** -3.324	-1.139*** -3.680	-1.124*** -4.206	-1.148*** -4.463
Rocky Mountain	1.042 1.066	0.506 0.557	-0.361 -0.519	-0.867 -1.226	0.056 0.098	-0.458 -0.795
Pacific	-1.494* -1.831	-1.511 -1.999	-2.064*** -4.681	-1.791*** -3.924	-1.952*** -5.046	-1.864*** -4.875
T-statistics in italics.						
* P-value < 10%						
** P-value < 5%						
*** P-value < 1%						

Table 7a: Staffing Robustness Checks: Pressure Ulcers						
	Not-for-profits		For-profits		All facilities	
Time Trend Constant	1.491*** 2.524	1.471*** 2.365	0.194 0.449	0.140 0.323	0.164 0.511	0.431 1.216
Ownership Variables						
Not-for-profit in 1999					0.248* 1.711	0.300** 2.006
Not-for-profit to for-profit conversion	-0.75 -0.886	-1.041 -1.275			0.066 0.082	-0.266 -0.322
For-profit to not-for-profit conversion			1.745* 1.939	0.957 1.021	0.926 1.001	0.263 0.285
Care Staffing						
Registered nurse staff HPRD		1.612*** 5.148		-0.174 -0.658		0.358* 1.780
Licensed practical nurse staff HPRD		0.512** 1.830		0.135 0.784		0.231 1.520
Certified nurse aide staff HPRD		0.040 0.311		-0.162* -1.932		-0.138* -1.894
% of licensed nursing staff contracted		0.009 0.791		0.014* 1.816		0.015** 2.427
Therapy staff HPRD		-1.306*** -2.196		0.707* 1.939		-0.063 -0.194
Table 7b: Staffing Robustness Checks: Physical Restraints						
	Not-for-profits		For-profits		All facilities	
Time Trend Constant	-6.313*** -4.661	-6.670*** -4.974	-4.528*** -4.841	-4.271*** -4.537	-4.932*** -6.681	-4.831*** -6.439
Ownership Variables						
Not-for-profit in 1999					-0.286 -0.922	-0.284 -0.917
Not-for-profit to for-profit conversion	-3.624** -2.056	-4.011** -2.293			-4.576** -2.508	-4.782*** -2.654
For-profit to not-for-profit conversion			1.869 0.993	1.355 0.712	0.278 0.153	-0.013 -0.007
Care Staffing						
Registered nurse staff HPRD		-0.027 -0.052		-0.558 -1.003		-0.389 -1.039
Licensed practical nurse staff HPRD		-0.574 -1.098		-0.496 -1.291		-0.410 -1.335
Certified nurse aide staff HPRD		0.249 0.912		0.246 1.328		0.170 1.126
% of licensed nursing staff contracted		-0.004 -0.191		-0.961 -1.293		-0.005 -0.357
Therapy staff HPRD		-0.642 -0.629		-0.001 -0.072		-0.425 -0.662
Table 7c: Staffing Robustness Checks: Antipsychotic Medication						
	Not-for-profits		For-profits		All facilities	
Time Trend Constant	7.715*** 7.438	7.608*** 7.468	7.818*** 9.684	7.862*** 9.685	8.523*** 13.630	8.227*** 13.074
Ownership Variables						
Not-for-profit in 1999					-1.059*** -3.941	-1.066*** -3.963
Not-for-profit to for-profit conversion	0.943 0.691	0.571 0.424			0.026 0.018	-0.585 -0.396
For-profit to not-for-profit conversion			1.295 0.760	1.729 1.006	1.272 0.804	1.291 0.803
Care Staffing						
Registered nurse staff HPRD		-1.057** -2.395		-0.358 -0.735		-0.645** -1.911
Licensed practical nurse staff HPRD		-0.124 -0.309		0.201 0.623		0.217 0.829
Certified nurse aide staff HPRD		0.354* 1.742		-0.178 -1.140		-0.029 -0.226
% of licensed nursing staff contracted		-0.033* -1.914		-0.020 -1.412		-0.021* -1.887
Therapy staff HPRD		-0.415 -0.520		-1.542** -2.034		-1.222** -2.075
T-statistics in italics. All regressions are estimated with instrumental variables and include facility characteristics, resident mix, community, competition, policy, and region variables. Including staffing does not significantly change the coefficients						
* P-value < 10%						
** P-value < 5%						
*** P-value < 1%						

Table 8a: Facility Acquired Robustness Checks: Pressure Ulcers						
	Not-for-profits		For-profits		All facilities	
	All	Facility acquired	All	Facility acquired	All	Facility acquired
Time Trend Constant	1.491*** <i>2.524</i>	0.618 <i>1.503</i>	0.293 <i>0.663</i>	0.363 <i>1.064</i>	0.345 <i>0.942</i>	0.439 <i>1.487</i>
Ownership Variables						
Not-for-profit in 1999					0.299** <i>2.297</i>	0.241** <i>1.938</i>
Not-for-profit to for-profit conversion	-0.753 <i>-0.886</i>	-0.777 <i>-1.188</i>			0.376 <i>0.832</i>	-0.551 <i>-0.845</i>
For-profit to not-for-profit conversion			0.033 <i>0.076</i>	1.352* <i>1.913</i>	-0.081 <i>-0.183</i>	0.363 <i>0.495</i>
Table 8b: Facility Acquired Robustness Checks: Physical Restraints						
	Not-for-profits		For-profits		All facilities	
	All	Facility acquired	All	Facility acquired	All	Facility acquired
Time Trend Constant	-6.313*** <i>-4.661</i>	-3.608*** <i>-3.198</i>	-4.953*** <i>-5.046</i>	-1.838** <i>-2.344</i>	-4.932*** <i>-6.681</i>	-2.569*** <i>-4.199</i>
Ownership Variables						
Not-for-profit in 1999					-0.286 <i>-0.922</i>	-0.295 <i>-1.109</i>
Not-for-profit to for-profit conversion	-3.624** <i>-2.056</i>	-2.996** <i>-2.027</i>			-4.576** <i>-2.508</i>	-2.149 <i>-1.377</i>
For-profit to not-for-profit conversion			-0.427 <i>-0.628</i>	0.115 <i>0.077</i>	0.278 <i>0.153</i>	0.051 <i>0.032</i>
T-statistics in italics. All regressions are estimated with instrumental variables and include facility characteristics, resident mix, community, competition, policy, and region variables. * P-value < 10% ** P-value < 5% *** P-value < 1%						

ⁱ The literature on the quality of care provided by the health care industry does not come to a consensus if there is a difference between FPs and NFPs (Davis, 1991; Rosenau and Linder, 2003; Hillmer, 2005; Schlesinger and Gray, 2006a, 2006b). However, many of these studies use cross-sectional data and do not address the endogeneity of selection in ownership structure. Therefore, it is still an open question whether FPs and NFPs differ in quality.

ⁱⁱ Congress made temporary modifications to reimbursement rates under PPS in the Medicare Balanced Budget Refinement Act of 1999 (BBRA) and the Benefits Improvement and Protection Act of 2000 (BIPA). These payment increases were set to expire in 2002.

ⁱⁱⁱ Brody (2006) provides a review of legal issues related to not-for-profit changes in purpose, sale, merger, and conversion.

^{iv} A White (1980) test for heteroscedasticity for each specification and quality measure rejected the null hypothesis that the error term has a constant variance.

^v The conditional variance is estimated as an unknown function of an index with the squared residual as the dependent variable. The estimator is Semiparametric Least Squares developed by Ichimura (1993).

^{vi} A score test for heteroscedasticity in discrete choice models (Pagan and Vella, 1989) rejected the null hypothesis that there was no heteroscedasticity.

^{vii} This model is termed a double index model because the probability of conversions is dependent on Z through the “aggregators” or indices $Z\beta_0$ and $Z\pi_0$. See Ichimura and Lee (1991) for a general discussion of multiple index models. Klein and Spady (1993) provide a likelihood-based estimator for this model when there is no heteroscedasticity. Klein and Vella (2006) provide the extension for the current model.

^{viii} With $P[Y = 1 | Z] = F\left[\frac{Z\beta_0 + c_0}{1 + s(Z\pi_0)}\right]$, the marginal effect represents the impact on the $P[Y = 1 | Z]$ when Z is

evaluated at its mean and one variable is changed. The amount of the change in the explanatory variables is a one standard deviation increase if the variable is continuous or a discrete change from 0 to 1 if a binary indicator.

^{ix} There are several variables in Z that are excluded from the quality equation. In addition, note that the conversion model can be written as:

$$D = \begin{cases} 1 & \text{if } Z^* \beta_0 + c_0^* > \varepsilon \\ 0 & \text{Otherwise} \end{cases}, \quad Z^* = Z / [1 + s(Z\pi_0)].$$

Effectively, all the Z^* variables are excluded from the quality model.

^x Government owned facilities have different characteristics and provide services to very different populations than privately owned nursing homes. Further, the choice of a facility to convert for a government facility is driven by political rather than economic factors.

^{xi} Surveys between the years of 1999 and 2004 were used to verify that facilities converted once during the period.

^{xii} Eighty-one percent of the facilities without a survey in 2004 were closed by 2003. The other nineteen percent of facilities either were closed after 2003 or had a survey after January 2005.

^{xiii} Urbanicity is measured using the WWAMI Rural Health Research Center’s categorization C for RUCA codes. Categorization C divided ZIP codes into urban and rural based on population dispersion and commuting patterns.

^{xiv} The use of a facility specific reimbursement rate would suffer from endogeneity. The average Medicaid reimbursement rate does not suffer from endogeneity problems because any given facility does not have a significant impact on the average state per diem rate.

^{xv} The county is the most commonly used market definition in nursing home studies because the exact origins of residents are unknown (Nyamn, 1985; Zinn, 1994).

^{xvi} Facility acquired was defined as the proportion of residents with the condition minus the proportion of residents with the condition at admission.