

PRELIMINARY: PLEASE DO NOT CITE OR QUOTE

Nursing Home Quality as a Public Good

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ABSTRACT. There has been much debate among economists about whether nursing home quality is a public good across Medicaid and private-pay patients within a common facility. However, there has been only limited empirical work addressing this issue. Using a unique individual level panel of residents of nursing homes from seven states, we exploit both within-facility and within-patient variation in payer source and quality to examine this issue. We find mixed evidence as to whether nursing home quality is a public good using traditional fixed effects specifications. In a model accounting for the timing of the transition effect, there is some evidence of declining quality for individuals who transition to Medicaid, but the decline appears to be part of a broader downward trend and generally does not suggest a Medicaid causal effect.

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A principal goal of the Medicare-Medicaid legislation passed by Congress in 1965 was the incorporation of the elderly and poor into “mainstream” medical care. Despite this objective, there have been a series of studies and reports documenting poor quality for Medicaid residents within nursing homes over the last three decades (e.g., U.S. Senate, 1974; Institute of Medicine, 2001). Given low Medicaid payment rates in many parts of the country, researchers have basically assumed that poor quality for Medicaid recipients is a cross-facility phenomenon. That is, homes with a higher proportion of Medicaid recipients provide a lower level of quality, *ceteris paribus*. The research community has basically ignored the idea that there may be within-facility variation by assuming that nursing home quality is a public good enjoyed by all residents within a facility, regardless of payer type.

There are both legal and economic arguments underlying this assumption. From a legal perspective, nursing homes certified to accept Medicaid or Medicare residents are required by the Centers for Medicare & Medicaid Services (CMS) to provide equal quality to all residents, regardless of payer type. However, monitoring and enforcing this uniform quality constraint is quite difficult. Towards that end, the General Accounting Office (1990) has received reports of the segregation of Medicaid and private-pay residents within a nursing home. From an economic perspective, certain nursing home services such as dietary services are produced jointly for both payer types and may exhibit economies of joint production (Gertler and Waldman, 1992). However, the majority of direct care nursing home services would not exhibit economies of joint production. Moreover, there is substantial evidence from the physician and hospital settings that patients with different payer sources are treated differently (Gruber, 2000).

If quality is a public good across payer types, then there is the potential for state Medicaid programs to “free ride” on higher paying private residents. In order for this to occur,

state Medicaid programs need to ensure the joint care of Medicaid and private-pay residents in a common facility. Historically, most states have used certificate of need and construction moratorium laws to constrain the growth of nursing home beds. The stated rationale of these programs was to conserve Medicaid spending by limiting Medicaid bed slots, but a secondary goal was to limit the ability of private-paying residents to segregate themselves in facilities without Medicaid patients. Under a binding bed constraint, homes have historically competed for private-paying patients but treated Medicaid demand as given, leading to negative implications for quality and access to services. Thus, the benefits of cross-subsidization may have been attenuated by the disincentives to compete for Medicaid patients in the presence of a binding bed constraint.

Although economic analyses of the nursing home industry routinely assume uniform quality across payer types (e.g., Nyman, 1988b; Gertler, 1989; Grabowski, 2001), there has been only limited empirical work supporting this assumption. This lack of previous work relates to the types of nursing home data previously available to researchers. Broadly, two alternative types of nursing home data were available: facility-level administrative databases and nationally representative surveys of nursing home residents. With the former, because the data are collected at the facility-level, there is no means by which to parse out within-facility quality differences by payer type. With the latter, the data are collected at the resident-level, but there are rarely a sufficient number of residents sampled from any one facility to make meaningful within-facility comparisons. Thus, neither of these data sources can address the research question of whether nursing home quality is a public good.

We explore this issue using a valuable new source of nursing home data. The Omnibus Budget Reconciliation Act of 1987 (OBRA 87) mandated that each state collect a quarterly

assessment for all residents in certified nursing homes. In the fourth quarter of 1998, CMS established a national repository of these data. We currently have access to this repository through the fourth quarter of 2002. We have identified seven states from this national repository with accurate quarterly payer source information over time.

With this unique individual level panel of nursing home data, we exploit two alternative sources of variation in payer source and quality. First, we recognize that the mix of Medicaid and private-pay residents will shift over time within facilities. Thus, the first identification strategy compares the quality of care for Medicaid and private-pay residents as the payer mix shifts within facilities over time. The second, and preferred, identification strategy is to exploit “spend down” from private-pay to Medicaid status for individual residents. Thus, we compare the change in quality over time for private-pay residents who qualify for Medicaid relative to the change in quality over time for residents who remain private payers. Additionally, we present estimates from a fuller model to ensure that there are no pre-existing trends that accompany changes in payer status, and to capture any dynamic impacts of changes in payer status.

Ultimately, we found little evidence refuting the idea that nursing home quality is a public good. Using traditional fixed effects specifications, the estimates run in both directions, but the effects are generally quite small. In a model accounting for the timing of the transition effect, there is some evidence of declining quality for individuals who transition to Medicaid, but the decline appears to be largely part of a broader downward trend and generally does not suggest a Medicaid causal effect.

I. Background

Nursing Home Sector

Nursing home residents requiring custodial care generally either pay for care privately or by qualifying for a Medicaid-financed stay. Medicaid is the dominant purchaser of nursing home services accounting for roughly 50% of all nursing home expenditures and 70% of all bed days. In practice, nursing homes have a great deal of discretion as to which patients they choose to accept for admission. The only constraint is that a facility must be certified in order to accept Medicaid and Medicare residents (and certification is almost universal among homes with approximately 96% certified) (Strahan, 1997). In contrast, homes are quite restricted in their ability to discharge residents (regardless of payer type) once they have been admitted.¹

Private-paying residents are charged the price chosen by the home subject to market competition while Medicaid residents are paid for by various methods via state-run programs. States have considerable flexibility to design their Medicaid nursing home payment systems and set payment rates. Medicaid programs generally pay below the private price. Not surprisingly, the majority of empirical evidence supports the assertion that Medicaid residents have more restricted access to nursing homes (e.g., Ettner 1993). Medicaid eligibility is determined on a state-by-state basis by the resident's level of income and assets. Some residents qualify for Medicaid at the time of entry to the nursing home while others "spend-down" in order to qualify for coverage. That is, these individuals do not meet the state Medicaid asset threshold at the time of nursing home entry, but in the course of paying for their nursing home care, their assets

¹ The facility may not transfer or discharge the resident unless: 1) The transfer or discharge is necessary to meet the resident's welfare and the resident's welfare cannot be met in the facility; 2) The transfer or discharge is appropriate because the resident's health has improved sufficiently so the resident no longer needs the services provided by the facility; 3) The safety of individuals in the facility is endangered; 4) The health of individuals in the facility would otherwise be endangered; 5) The resident has failed, after reasonable and appropriate notice, to pay for a stay at the facility (note that conversion from the private-pay price to payment at the Medicaid rate does not constitute non-payment); or 6) The facility ceases to operate (Health Care Financing Administration 1995).

decline to the state threshold and they qualify for Medicaid-financed care. Studies have estimated that only between 10 and 25% of all private-paying residents eventually spend-down to Medicaid eligibility (Adams, Burwell and Meiners, 1993).

Even though the Medicaid rate is below the private price in most cases, homes that are certified to accept Medicaid residents are required by the Centers for Medicare and Medicaid Services (CMS) to provide a uniform level of quality to all residents, regardless of payer type. The nursing home State Operations Manual published by CMS (formerly the Health Care Financing Administration) states that “facilities must not distinguish between residents based on their source of payment when providing services that are required to be provided under the law. All nursing services, specialized rehabilitative services, social services, dietary services, pharmaceutical services, or activities that are mandated by the law must be provided to residents according to residents’ individual needs, as determined by assessments and care plans” (Guideline 483.12(c), Health Care Financing Administration, 1995). If homes indeed provide quality common to all residents, then Medicaid residents have the potential to “free ride” on higher paying private residents. If homes can disregard this regulation, then homes can provide different quality levels to residents from different payer types.

Existing Evidence on Variation in Nursing Home Quality by Payer Type

Chandra and Skinner (2003) suggest that disparities in health care should be decomposed into their proximate causes with respect to “across facility” variation (i.e., certain patients are admitted to facilities with poorer care practices) and “within facility” variation (i.e., certain patients are treated differently within a health care facility). Both sources of variation can lead to poorer outcomes for certain payer groups, but the difference lies in the policy implications. In the case of across-facility disparities in care, policymakers may wish to consider initiatives that

improve the patient's choice set, address broader geographic disparities in resources, guard against discriminatory admission practices, and prevent the segregation of payer types across homes. For example, states can adopt wait list laws that require nursing homes to admit applicants on a first-come, first-served basis or census requirements that involve admissions on a first-come, first-served basis until a specified census of Medicaid residents is achieved (General Accounting Office, 1990). Within-facility variation involves the internal workings of specific health care facilities, and financial barriers, preferences of patients, and provider behaviors may underlie disparities across payer groups. Policymakers may wish to consider stricter enforcement of the uniform quality standard, or rate equalization laws such as those found in Minnesota and North Dakota that prohibit homes from charging rates for private-payers above the Medicaid payment level.

There is a substantial literature examining across-facility variation in nursing home quality by payer mix. A number of studies have shown that a higher proportion of Medicaid residents within a nursing home is negatively related to expenditures by the facility (e.g., Birnbaum et al., 1981; Nyman, 1988a; Schlenker and Shaughnessy, 1984). Gottesman (1974) found that frequency of care by staff members diminished with higher numbers of public-pay residents. In contrast, Nyman (1988c) found no significant relationship between the proportion of Medicaid residents and the ratings of patient care or dietary plans. The use of outcome measures in this literature is scant. Nyman (1988c) revealed no Medicaid-quality relationship with respect to resident care or quality-of-life measures. In related work however, Nyman (1988b) did find that regulatory violations occur with greater frequency in high Medicaid homes. Part of the explanation for the mixed results may be the failure of these studies to address the potential endogeneity of facility-level payer mix and quality.

There is virtually no existing work examining within-facility variation in nursing home quality. A consumer advocacy group in New York reported to the U.S. General Accounting Office (1990) that, “many nursing homes were...segregating Medicaid and private-pay residents within the nursing home” (page 18). However, there is very little work that has empirically tested this issue. Using 1983 Texas Medicaid cost report data, McKay (1989) found that the mix of Medicaid and private-pay residents did not affect a facility’s marginal, average or total costs, which provides some very limited evidence that private-pay and Medicaid residents receive a uniform level of care. However, expenditures are a very indirect (and highly criticized) measure of quality. Greater expenditures can mean higher quality or they can mean increased inefficiency on the part of the facility. Troyer (2004) found large cross-facility differences in mortality for Medicaid and private-paying residents in Florida for the period 1986 through 1997. However, when facility fixed-effects were included, these mortality differences largely fell away, suggesting that there is not within-facility variation across Medicaid and private paying residents.

Model of the Nursing Home Industry

From the *Handbook of Health Economics* chapter on long-term care (Norton, 2000), the canonical model of the nursing home assumes that private-pay and Medicaid residents receive a uniform level of quality (q). In this model, state-level certificate-of-need (CON) and construction moratorium laws act as a barrier to entry by constraining the number of allowable beds in the marketplace (Scanlon, 1980). Because state Medicaid programs pay below the private-pay price, a facility will first accept higher-paying private-pay residents and then fill the remaining beds with Medicaid residents. Thus, private-pay demand is still satisfied under a binding bed

constraint, but some potential Medicaid residents may not gain nursing home placement creating an excess Medicaid demand equilibrium.

Under this excess demand model, private-pay demand (x) is assumed to be a function of private price (p) and quality, but Medicaid demand is not assumed to be a function of quality. After private-pay demand is met, it is assumed that the home can always fill any remaining beds with Medicaid recipients, regardless of the quality provided. In essence, a home need not consider the preferences of Medicaid residents in solving its profit-maximization problem. Thus, Medicaid usage can be modeled as the number of beds remaining after private-pay demand has been satisfied, or, $[\bar{x} - x(p, q)]$ where \bar{x} is some target level of filled beds for the home (here assumed to be capacity). Additionally, because it is assumed that this bed constraint is binding, the home will always reach this target occupancy, and the cost function can be evaluated at \bar{x} . Thus, the nursing home takes the Medicaid payment rate (r) and its own bed supply (\bar{x}) as givens, and chooses the private price and a uniform level of quality to maximize profits:

$$\max_{p,q} \pi = px(p, q) + r(\bar{x} - x(p, q)) - c(q | \bar{x}). \quad (1)$$

In this model, it is assumed that $x_p < 0$, $x_q > 0$, and $c_q > 0$. The first-order conditions with respect to price and uniform quality are:

$$\pi_p = (p - r)x_p + x = 0, \quad (2)$$

$$\pi_q = (p - r)x_q - c_q = 0. \quad (3)$$

The first-order conditions provide the standard implication that the nursing home sets the marginal revenue from a change in either private price or quality of care to be equal to the marginal cost.

A number of papers have used this general framework to derive testable implications regarding the effect of the Medicaid reimbursement on nursing home quality (e.g., Gertler, 1989; Grabowski, 2001). Given the potential quality improvement for Medicaid recipients when integrated in a common nursing home with private-paying residents, Norton (2000) argued that the payer mix itself may be a policy instrument towards addressing low nursing home quality. For mathematical ease, Norton assumes that the policy variable is the number of Medicaid residents (not the proportion). If we suppose that a binding rule on the number of Medicaid residents (m) is relaxed slightly but there is still excess demand, then the number of private-pay residents is the total number of beds less the number of Medicaid residents. The nursing home will offset the increase in Medicaid residents one-for-one with a decrease in private-pay residents. If the constraint is binding, Norton shows that it is not necessary to solve a system of equations to find the effect of a change in the number of Medicaid residents on private-pay price and quality:

$$\frac{dp}{dm} = -\frac{dp}{dx} > 0, \quad (4)$$

$$\frac{dq}{dm} = -\frac{dq}{dx} < 0. \quad (5)$$

Thus, if a binding constraint on the number (or proportion) of Medicaid residents is relaxed, the private-pay price increases and the quality of care decreases. By limiting the proportion of Medicaid residents a facility can admit (and thus effectively exposing Medicaid residents to more private-pay residents), we would theoretically see an improvement in the provision of quality for Medicaid residents. However, this result assumes that quality is uniform across Medicaid and private-pay residents. If we were to relax the uniform quality assumption across

payer types, then the gains of placing Medicaid recipients in a home with private-paying residents would be attenuated.

II. Data and Empirical Strategy

Data

Our data are a census of all nursing home residents from seven states obtained from the Minimum Data Set (MDS) for nursing homes. Based on a federal requirement, the MDS instrument collects over 350 discrete data elements including socio-demographic information, numerous clinical items ranging from degree of functional dependence to cognitive functioning, and a checklist for staff to indicate the presence of the most common geriatric diagnoses (MDS Training Manual, 1995; Morris et al., 1994). Typically, the MDS form is filled out by a registered nurse (RN) working at the facility. Assessments are performed on admission, upon significant change, and at least quarterly, so that there is a panel of assessments for the same individual over time. When there were multiple assessments within a quarter, we used the assessment closest to the mid-point of the quarter.

We have access to the MDS beginning in 4th quarter of 1998 through the 4th quarter of 2002 (see Table 1 for descriptive statistics). As such, our data are a combination of existing residents (those admitted prior to 4th quarter 1998) and new admissions (those admitted 4th quarter of 1998 or later). We alternatively estimate models below containing the full sample (N=1,626,628) and only those new admissions (N=872,667).

INSERT TABLE 1 HERE

The analysis was restricted to seven states because accurate payer source information was not available for the other states. Payer source on admission was nearly always recorded on the

MDS form, but in many instances, the payer source field was not updated in subsequent MDS assessments. Thus, we were not able to obtain accurate payer source information over time for the majority of states. Based on a series of checks, the seven states with accurate payer source information used within this study were Kansas, Maine, Mississippi, North Dakota, Ohio, South Dakota and Washington.²

Payer status is coded on each quarterly MDS assessment based on ten categories measuring nursing home payment via (i) a Medicaid per diem, (ii) Medicare per diem, (iii) Medicare ancillary part A, (iv) Medicare ancillary part B, (v) CHAMPUS per diem, (vi) VA per diem, (vii) self or family pays full per diem, (viii) Medicaid resident liability or Medicare co-payment, (ix) private insurance per diem (including co-payment), and (x) other per diem. Importantly, these categories are not mutually exclusive. For example, in order to qualify for the Medicaid per diem payment (category i), some individuals face a co-payment (category viii) for any income they have above the state Medicaid income threshold. In an effort to create three payment categories, we used a series of decision rules in placing residents into the Medicaid, private-pay, and other payer groups. First, because we are interested in the primary payer within this study, we did not consider ancillary Medicare payments (categories iii and iv). Second, because we are interested in chronic (and not rehabilitative) nursing home care, we excluded those Medicare assessments from the analysis. That is, any assessment coded in category (ii) was dropped from our dataset. Third, any individual in category (vii) or category (ix) was considered *private-pay*. Fourth, we categorized all individuals from group (i) as *Medicaid*, regardless of

² We used three separate checks to ensure the quality of the payer source field within the MDS. First, we examined whether patients that entered under Medicare converted to another payer type at the 100-day Medicare limit. Second, we compared the aggregate facility-level payer mix from the MDS with the aggregate payer mix from the Federal government's Online, Survey Certification and Reporting System. Finally, we compared spend-down rates from private-pay to Medicaid status in the MDS with published estimates from other data sources.

whether they faced some co-payment (viii). Finally, we created an *other payer* group for individuals in CHAMPUS (category v), VA (category vi) and other (category x).

Twelve different individual-level quality measures were used within the MDS. The first measure of quality was whether the individual had a pressure ulcer at the quarterly MDS assessment. Pressure ulcers are areas of the skin and underlying tissues that erode as a result of pressure or friction and/or lack of blood supply. The next measure was the presence of daily pain. Pain is a common condition related to numerous age associated diseases such as cancer, arthritis, and diabetic neuropathy. However, pain can be moderated, and the management of pain in the nursing home setting is often substandard (Ferrell, 1995). The presence of a physical restraint was used as a measure of quality. Immobility resulting from the use of physical restraints may increase the risk of pressure ulcers, depression, mental and physical deterioration, and mortality (Zinn, 1993). Bowel or bladder incontinence was the next measure of quality. Although some decline in bladder or bowel continence may not be reversible or manageable in the latter stages of disease (e.g., dementia, terminal illness), it is thought to be preventable and reversible in the nursing home population (Schnelle and Leung, 2004). The next measure was whether the individual used an indwelling catheter. Urethral catheterization places the resident at greater risk for urinary tract infection; other long-term complications include bladder and renal stones, abscesses, and renal failure.

An indicator of whether the individual was bedfast was also used as a measure of quality. Although many residents are bedfast due to medical conditions, bedfast residents are at a higher risk of developing pressure ulcers and other complications. The next measure was whether a feeding tube was used in the care of the resident. Feeding tubes can result in complications including self-extubation, infections, aspiration, unintended misplacement of the tube, and pain.

The use of anti-psychotics was also employed as a measure of quality. Overuse of anti-psychotics may result in mental and physical deterioration (Harrington et al, 1992). The next two measures indicated whether the individual had a urinary tract or wound infection. Infections occur frequently among nursing home residents with the potential for significant morbidity and mortality (Nicolle, 2000). The presence of a fall within the nursing home over the 30 days prior to the assessment was also used as a measure of quality. Falls are a major source of morbidity and mortality among nursing home residents. Although falls have been shown to be preventable in the nursing home environment, approximately half of all patients fall each year, and 9% sustain serious injury (Ray et al., 1997). Finally, an indication of depression was used as a measure of quality. Major depression is associated with increased functional dependence, health care utilization, and mortality (Simmons et al., 2004).

A number of patient-level covariates were available from the MDS. In order to capture the need for services, an activities of daily living (ADL) score was created for each resident assessment. The ADL score is based on the individual's need for help with bathing, bed mobility, dressing, eating, toileting, and transferring. For each of these six areas, the individual is scored as a zero (independent), one (supervised), two (limited assistance), three (extensive assistance) or four (total dependence). Thus, the total ADL score ranges between zero and twenty-four. For the purposes of the analyses, we separated the data into four quartiles: ADL score less than 10, ADL score of 10-14, ADL score of 15-19 and ADL score greater than 19. In order to capture cognitive performance, we also included seven dummy variables, ranging from zero to six in value, from the Cognitive Performance Scale (CPS) developed by Morris and colleagues (1994). We also include a set of dummy variables measuring length-of-stay. Finally, we also included a number of demographic variables including age, race, education, and marital status.

The MDS assessments from these seven states were merged with two other facility-level data sources. First, the MDS is a resident-level instrument that does not contain facility-level information. Thus, ownership status and other institutional information on nursing homes are obtained from the On-Line Survey, Certification, and Reporting (OSCAR) system. The OSCAR system contains information from state surveys of all federally certified Medicaid (nursing facilities) and Medicare (skilled nursing care) homes in the United States. Certified homes represent almost 96% of all facilities nationwide (Strahan, 1997). Collected and maintained by the Centers for Medicare and Medicaid Systems (CMS), the OSCAR data are used to determine whether homes are in compliance with federal regulatory requirements. Every facility is required to have an initial survey to verify compliance. Thereafter, states are required to survey each facility no less often than every 15 months, and the average is about 12 months (Harrington et al., 1999). From the OSCAR, we included measures of bed size, ownership status, and chain ownership.

Second, we obtained nursing home cost report information from each state's Medicaid office. These annual cost reports provided data on the private-pay and Medicaid payment rates for each facility. Table 2 provides the average payment rates for each state and year contained in our study. Without adjusting for resident acuity, the Medicaid payment rate ranges from 76% to 108% of the private-pay price. North Dakota is the only state with a higher (unadjusted) Medicaid rate relative to the private-pay rate across all years.³ As discussed above, North Dakota has a rate equalization law under which all residents – regardless of payer type – are grouped into one of thirty-five payment levels based on their acuity. Thus, the higher aggregate Medicaid payment rate reflects the fact that Medicaid patients are less healthy relative to their private-pay counterparts.

³ The results presented in this paper are robust to excluding the North Dakota assessments from the analyses.

INSERT TABLE 2 HERE

Empirical Strategy

We offer a series of specifications following the approach of Jacobson, LaLonde & Sullivan (1993) in analyzing earnings losses following job displacement. Using the data described above, the initial specification for the empirical results presented here is:

$$Y_{int} = \alpha + \beta_1 \text{OTHER}_{int} + \beta_2 \text{MEDICAID}_{int} + \delta X_{int} + \gamma Z_{nt} + \alpha_t + \lambda_n + \varepsilon_{int} \quad (1)$$

where i indexes individuals, n indexes nursing homes, and t indexes time periods, Y is the outcome variable, OTHER and MEDICAID are dummies for other payer and Medicaid (relative to private-pay), X is a set of individual characteristics, Z is a set of nursing home characteristics, α_t are time (quarter) fixed effects, λ_n are nursing home fixed effects and ε_{int} is the randomly distributed error term. The nursing home fixed effects control for any fixed facility-specific omitted variables correlated with the quality of care such as the facility's management philosophy or facility culture. The quarter dummies control for national trends in nursing home quality that may be correlated with shifts in the mix of Medicaid and private-pay residents. Thus, the basic identification strategy implicit in Equation (1) purges the unobserved and potentially confounded cross-sectional heterogeneity by relying on the within-facility variation across payer types over time and by using homes that did not experience changes in payer types as a control for unrelated time-series variation.

Although the fixed-effects specification above eliminates time-invariant heterogeneity at the level of the facility, it may still suffer from bias due to unobserved heterogeneity at the level of the patient. For example, even though we control for detailed case-mix information in the model above, there may still exist unobserved health characteristics that influence nursing home outcomes. Thus, we next estimate models of the following form:

$$Y_{int} = \alpha + \beta_1 \text{OTHER}_{int} + \beta_2 \text{MEDICAID}_{int} + \delta X_{int} + \gamma Z_{nt} + \alpha_t + \mu_i + \varepsilon_{int} \quad (2)$$

where the model specification is identical to equation 1 above except the facility fixed effects are replaced with patient fixed effects μ_i . In this model, the basic identification strategy purges the unobserved time-invariant heterogeneity by relying on spend-down from private-pay to Medicaid status over time.

We next move to a fuller model to ensure that there are no pre-existing trends that accompany changes in payer status, and to capture any dynamic impacts of changes in payer status. We do so by specifying a richer model of the form:

$$Y_{int} = \alpha + \beta_1 \text{OTHER}_{int} + \sum_{-k < j < m} \theta_j \text{MEDICAID}^j_{int} + \delta X_{int} + \gamma Z_{nt} + \alpha_t + \mu_i + \varepsilon_{int} \quad (3)$$

where the single Medicaid dummy variable is replaced by a set of dummies measuring the periods leading up to spend-down to Medicaid, the period of spend-down and the periods following spend-down. Once again, this model is identified by within-patient variation in payer status over time, but the pre-spend down terms (the $-k$ terms) allow for a changing pattern of use in the periods before qualifying for Medicaid. That is, this model allows for any deterioration in outcomes that is not Medicaid related, but is correlated with moving onto Medicaid. Then, we have terms for the periods after qualifying for Medicaid (the m terms) to measure how outcomes evolve once the patient moves onto Medicaid.

For each specification above, we estimate both a model including all the residents in our dataset (i.e., existing plus newly admitted residents) and a model with only those new admissions (i.e., individuals admitted in the 4th quarter of 1998 or later). Given the size of our dataset, least squares models estimations of linear probability regression models are presented. Although this approach does not recognize the binary nature of the quality measures, it facilitates the tractable estimation of these models, which are based on a large number of observations and an expansive

set of regression controls. In the results tables presented below, only the Medicaid coefficients and the absolute value of the t-statistics are included. Full results are available upon request from the authors.

III. Results

Nursing Home and Individual Fixed Effects Models

The first set of regression results includes both the existing residents when our MDS panel started and residents admitted in that and subsequent quarters (see Table 3). Importantly, all twelve outcomes are negative indicators of quality; thus, a positive Medicaid coefficient translates into lower quality for this payer group. Moreover, given our huge sample size, it should be noted that we have a great deal of precision in our estimates. Thus, nearly every coefficient estimate presented in Table 3 is statistically significant at the conventional level.

The first column of results excludes fixed-effects and is identified solely by cross-sectional variation in payer source and quality. Across six of the twelve measures, quality is lower for Medicaid recipients relative to private-payers. For example, incontinence is 1.8% greater and depression is 4.1% higher for Medicaid recipients, but falls are 2.4% lower. The second column presents results from a model that includes nursing home fixed effects. This model is identified by within-facility variation in payer status and nursing home quality. Once again, there is not a clear pattern in the results across quality measures. The results based on the depression (3.4%), incontinence (1.8%) and anti-psychotics (0.9%) measures indicate that quality is lower for Medicaid recipients. Alternatively, falls (-2.2%) and catheter use (-1.0%) indicate a statistically significant improvement in quality for Medicaid recipients.

The third column presents results from a model including patient-level fixed effects, which is identified by within-patient variation (i.e., spend-down to Medicaid). The depression

(2.3%), incontinence (1.3%), anti-psychotics (0.5%) and physical restraints (0.6%) measures indicate quality decreases following transition to Medicaid, but the remaining eight measures all show a statistically significant improvement in quality. Once again, the magnitude of the coefficients was generally small. Across all the results presented in Table 3, Medicaid and private-pay quality differed by over 2% for only falls and depression.

INSERT TABLE 3 HERE

The same three model specifications are next presented for only those individuals who we observe in the MDS from their date of admission (see Table 4). Basically, these results are similar to the results based on the entire sample. The effect sizes are generally small and quality is lower for Medicaid recipients when measured by physical restraints, incontinence, anti-psychotics and depression, but higher across the other eight measures.

INSERT TABLE 4 HERE

In sum, the traditional fixed effects specifications provide inconsistent results as to whether nursing home quality is a public good. Some measures indicated worse quality for Medicaid recipients while others indicated better quality. In general, the magnitude of the coefficients was quite small.

Timing of the Medicaid Effect

We next move to a fuller model to ensure that there are no pre-existing trends that accompany changes in payer status, and to capture any dynamic impacts of changes in payer status. Once again, we replace the Medicaid indicator variable with lead (quarters preceding spend-down to Medicaid), transition (quarter of spend-down) and lag (quarters following spend-down) dummy variables. If there is a Medicaid causal effect, we would expect small, statistically

insignificant coefficient estimates for the lead terms followed by larger, statistically significant coefficient estimates for the transition and lag terms.

We first consider the full sample of MDS assessments (see Table 5). Unlike the traditional fixed effects specifications, very few of the quality measures generate statistically significant terms. Basically, only the incontinence, catheter, feeding tube and depression measures indicate a statistically significant effect of payer status on quality in this framework. However, the catheter results exhibit a consistent trend upwards, and the feeding tube show a consistent trend downwards, starting before the transition to Medicaid. That is, the lead terms are statistically significant and roughly the same magnitude as the transition and lag terms. Thus, these results do not suggest a Medicaid causal effect, but rather a continuing (unbroken) trend.

However, the incontinence and depression results do indicate a potential negative effect of Medicaid on nursing home quality. For the depression measure, the lead terms are quite small, but following the transition to Medicaid, the estimates became comparatively larger. Specifically, there was a 0.9% increase in the quarter of transition, a 1.5% increase in the first quarter following transition, a 1.7% increase in the following quarter, and a 1.4% increase in 3 or more quarters following transition. Similarly, incontinence did not significantly increase until the second quarter following transition with a 1.4% increase in that quarter, and a 1.4% increase in 3+ quarters following transition.

INSERT TABLE 5 HERE

We also present estimates from this specification for only those residents who we observe from their admit date. The catheter and incontinence results are no longer statistically significant, but the feeding tube estimates once again exhibits a continuing downward trend. For the depression estimates, the transition and lag terms once again indicate a potential increase in

depression due to Medicaid, but the lead terms indicate this trend may have begun in the periods preceding the transition.

Overall, the trend model results provided very little support for a Medicaid causal effect. Only the depression and incontinence measures provided some limited support, but these results were not robust to limiting the analysis to only those individuals we observe from admission.

Alternate Specifications

As noted in Table 2, there is some variation across states in the Medicaid-private pay rate differential. Thus, we employed two different approaches to test whether quality differences between private-pay and Medicaid residents were greatest in those states with the largest difference between the private-pay price and Medicaid rate. These results are available upon request from the authors. First, we interacted a state's Medicaid-to-private rate ratio with an individual's Medicaid status. Second, we conditioned the model to low (Maine, South Dakota and Washington), intermediate (Kansas and Ohio) and high (Mississippi and North Dakota) rate ratio states. Across both approaches, there was not a clear quality difference in states with a larger payment difference. These results are consistent with the findings reported here that quality is common within facilities for Medicaid and private-paying residents.

V. Conclusions

Using traditional fixed effects specifications, this paper found mixed evidence as to whether nursing home quality is a public good. However, in a model that captures pre-existing trends and impacts over time in the change in payer status, there is some evidence of declining quality for individuals who transition to Medicaid, but the decline appears to be largely part of a broader downward trend and does not suggest a Medicaid causal effect. At most, there was some evidence of an increase in depression and incontinence following transition to Medicaid, but

these findings were not robust to limiting our sample to only those individuals we observe from admission. Overall, our results are consistent with the assumption of uniform quality across Medicaid and private-paying residents within facilities.

This result has both research and policy implications. From a research perspective, this study provides support for the long-standing practice of using facility-level data to evaluate Medicaid policy effects (e.g., Gertler, 1989). Although the MDS and other individual-level data are now becoming available to researchers, aggregate facility-level measures can still serve as a potential complement to the individual-level measures.

From a policy perspective, these results point towards the potential for free-ridership on the part of state Medicaid programs. If quality is a public good enjoyed equally by all payer types, then state Medicaid programs can potentially free ride on higher paying private residents. Although state Medicaid administrators have historically used certificate-of-need laws to help keep private-paying residents in joint care settings, two recent trends potentially undermine the value of private-paying patients to state Medicaid nursing home programs. First, assisted living and other nursing home substitutes have siphoned off some private-paying residents. In many instances, individuals exhaust their private resources in the assisted living sector before transitioning to Medicaid-financed nursing home care. Second, the nursing home industry has become more segregated across facilities over the last several years (Mor et al., 2004). That is, there are more facilities caring for predominantly Medicaid (or private-pay) residents, implying less potential for cross-subsidization across payer types. Thus, although quality may be uniform within facilities, market-based trends point towards fewer private-paying residents going to homes with Medicaid patients.

Table 1: Summary Statistics

	All assessments		Observed from admission	
	Mean	SD	Mean	SD
Pain	0.13	0.34	0.14	0.35
Pressure Ulcers	0.08	0.27	0.09	0.28
Physical Restraints	0.09	0.28	0.07	0.26
Incontinence	0.54	0.50	0.46	0.50
Catheters	0.08	0.26	0.09	0.29
Bedfast	0.06	0.23	0.05	0.22
Anti-psychotics	0.19	0.39	0.21	0.41
Feeding Tubes	0.07	0.25	0.06	0.24
Urinary infection	0.09	0.29	0.11	0.31
Wound infection	0.02	0.13	0.02	0.15
Fall	0.16	0.37	0.20	0.40
Depression	0.43	0.50	0.42	0.49
Medicaid	0.65	0.48	0.55	0.50
Private-payer	0.32	0.47	0.40	0.49
Other payer	0.04	0.19	0.04	0.20
Age	80.48	12.86	79.37	13.11
Length of stay	850.23	1,146.30	289.96	307.57
African American	0.09	0.29	0.09	0.29
Caucasian	0.90	0.30	0.90	0.30
Other Race	0.01	0.11	0.01	0.12
No High School	0.18	0.38	0.16	0.37
High School	0.17	0.37	0.18	0.38
Some College	0.06	0.24	0.07	0.25
College	0.03	0.18	0.04	0.19
Education Missing	0.56	0.50	0.56	0.50
Married	0.19	0.39	0.23	0.42
Never Married	0.13	0.34	0.12	0.32
Widowed	0.57	0.49	0.55	0.50
Divorced/Separated	0.11	0.31	0.11	0.31
ADL Score	14.04	6.73	13.15	6.41
CPS Score	2.92	1.79	2.61	1.73
Beds	130.02	76.94	130.43	81.92
For-profit	0.69	0.46	0.69	0.46
Nonprofit	0.28	0.45	0.28	0.45
Government	0.03	0.16	0.02	0.15
Chain Facility	0.62	0.49	0.63	0.48
Kansas	0.08	0.27	0.07	0.25
Maine	0.07	0.25	0.07	0.25
Mississippi	0.05	0.21	0.04	0.21
North Dakota	0.06	0.23	0.05	0.22
Ohio	0.59	0.49	0.58	0.49
South Dakota	0.03	0.16	0.02	0.15
Washington	0.14	0.35	0.17	0.37
N	1,626,628		872,667	

Notes: There are missing data for certain variables. ADL=activities of daily living; CPS=cognitive performance scale.

Table 2: Average Unadjusted Medicaid and private-pay rates per day of nursing home care (1998-2002)

State	Year	Facilities	Medicaid Rate	Private-Pay Rate	Medicaid rate/ private pay rate
Kansas	1998	357	78.94	84.82	0.93
	1999	356	85.55	92.48	0.93
	2000	349	92.78	99.48	0.93
	2001	344	98.02	106.71	0.92
	2002	325	101.10	109.00	0.93
Maine	1998	133	107.88	142.55	0.76
	1999	131	112.53	148.22	0.76
	2000	124	117.68	155.59	0.76
	2001	117	127.63	162.86	0.78
	2002	118	131.73	169.30	0.78
Mississippi	1998	183	85.82	86.89	0.99
	1999	184	90.32	93.69	0.96
	2000	182	99.26	100.98	0.98
	2001	193	108.32	100.75	1.08
	2002	185	112.91	108.30	1.04
North Dakota	1998-1999	81	104.28	102.22	1.02
	1999-2000	79	109.49	106.84	1.02
	2000-2001	79	127.03	123.67	1.03
	2001-2002	79	134.34	130.81	1.03
	2002-2003	78	132.39	128.69	1.03
Ohio	1998	719	114.95	135.25	0.85
	1999	671	117.71	140.48	0.84
	2000	731	123.34	143.05	0.86
	2001	836	134.43	150.54	0.89
	2002	811	149.36	156.06	0.96
South Dakota	1998-1999	106	79.42	99.61	0.80
	1999-2000	106	81.46	103.85	0.78
	2000-2001	106	85.53	106.67	0.80
	2001-2002				
	2002-2003				
Washington	1998	264	118.16	145.74	0.81
	1999	262	125.40	147.96	0.85
	2000	256	137.43	160.67	0.86
	2001	260	142.86	171.84	0.83
	2002	258	149.01	178.79	0.83

Notes: The rates are weighted by the total number of payer type days within each facility, but are not adjusted for resident acuity. For Kansas, Maine and South Dakota, total private days were not available so all non-Medicaid days were used to weight the private-pay rates. North Dakota and South Dakota report their rates from July to June.

Table 3: Medicaid and Nursing Home Quality: Total Sample

<i>Outcomes</i>	No Fixed Effects (1)	With Nursing Home Fixed Effects (2)	With Patient Fixed Effects (3)
Pain (N=1,425,147)	0.009 (13.10)	0.008 (11.76)	-0.009 (7.64)
Pressure Ulcers (N=1,425,319)	-0.007 (13.66)	-0.007 (12.38)	-0.011 (11.10)
Physical Restraints (N=1,622,346)	0.001 (1.66)	-0.002 (4.75)	0.006 (7.21)
Incontinence (N=1,460,200)	0.018 (24.58)	0.018 (24.25)	0.013 (11.86)
Catheters (N=1,622,362)	-0.011 (24.06)	-0.010 (20.24)	-0.014 (23.11)
Bedfast (N=1,622,358)	-0.002 (6.02)	-0.002 (4.24)	-0.007 (11.60)
Anti-psychotics (N=921,264)	0.014 (14.85)	0.009 (8.67)	0.005 (3.68)
Feeding Tubes (N=1,622,353)	0.0003 (0.80)	-0.002 (3.99)	-0.008 (19.83)
Urinary Infections (N=1,622,350)	-0.005 (8.84)	-0.004 (6.62)	-0.013 (11.49)
Wound Infections (N=1,622,350)	-0.004 (16.66)	-0.003 (13.58)	-0.004 (9.92)
Falls (N=1,622,303)	-0.024 (35.60)	-0.022 (31.82)	-0.019 (14.07)
Depression (N=1,620,973)	0.041 (45.55)	0.034 (36.79)	0.023 (23.35)

All models include the covariates listed in Table 1 along with time fixed effects. Absolute values of the t-statistics are presented in parentheses.

Table 4: Medicaid and Nursing Home Quality: Observed from Admission Only

<i>Outcomes</i>	No Fixed Effects (1)	With Nursing Home Fixed Effects (2)	With Patient Fixed Effects (3)
Pain (N=675,321)	0.004 (4.07)	0.006 (6.04)	-0.007 (4.68)
Pressure Ulcers (N=675,361)	-0.010 (13.14)	-0.010 (12.47)	-0.010 (7.42)
Physical Restraints (N=870,051)	-0.0001 (0.18)	-0.003 (4.13)	0.006 (5.80)
Incontinence (N=770,836)	0.019 (19.61)	0.019 (18.71)	0.008 (5.13)
Catheters (N=870,065)	-0.016 (23.63)	-0.013 (18.38)	-0.015 (17.80)
Bedfast (N=870,061)	-0.004 (8.24)	-0.003 (6.38)	-0.005 (6.71)
Anti-psychotics (N=386,606)	0.013 (9.22)	0.005 (3.74)	0.008 (4.11)
Feeding Tubes (N=870,056)	-0.003 (6.49)	-0.004 (6.52)	-0.007 (12.22)
Urinary Infections (N=870,055)	-0.006 (8.44)	-0.005 (6.01)	-0.013 (8.93)
Wound Infections (N=870,055)	-0.006 (17.91)	-0.006 (14.92)	-0.004 (6.94)
Falls (N=870,010)	-0.029 (30.95)	-0.027 (27.51)	-0.021 (11.03)
Depression (N=869,115)	0.044 (37.86)	0.039 (32.31)	0.023 (18.02)

All models include the covariates listed in Table 1 along with time fixed effects. Absolute values of the t-statistics are presented in parentheses.

Table 5: Model of transition (T) to Medicaid from private-pay: Full Sample

<i>Period</i>	Pain	Pressure Ulcers	Physical Restraints	Incontinence	Catheters	Bedfast	Anti- psychotics	Feeding Tubes
T-3+	0.005 (0.84)	0.013 (2.43)	-0.001 (0.21)	-0.006 (0.99)	0.011 (3.17)	0.011 (3.15)	0.007 (0.90)	-0.002 (0.78)
T-2	0.003 (0.46)	0.008 (1.46)	0.001 (0.28)	-0.00004 (0.01)	0.007 (2.14)	0.005 (1.24)	0.006 (0.79)	-0.001 (0.23)
T-1	0.004 (0.62)	0.007 (1.33)	0.003 (0.59)	0.003 (0.51)	0.008 (2.22)	0.004 (1.08)	0.006 (0.82)	-0.003 (1.10)
T	-0.001 (0.21)	0.005 (0.91)	0.002 (1.39)	0.004 (0.54)	0.008 (2.25)	0.003 (0.84)	0.006 (0.74)	-0.005 (2.13)
T+1	0.002 (0.32)	0.002 (0.39)	0.006 (1.24)	0.001 (1.65)	0.007 (2.14)	0.002 (0.53)	0.008 (1.03)	-0.006 (2.25)
T+2	-0.00004 (0.01)	0.001 (0.15)	0.005 (1.02)	0.014 (2.15)	0.015 (1.51)	0.001 (0.21)	0.011 (1.39)	-0.007 (2.60)
T+3+	-0.004 (0.61)	0.007 (1.28)	0.006 (1.14)	0.014 (2.23)	0.007 (2.27)	0.002 (0.55)	0.011 (1.45)	-0.008 (3.33)
	N=981,984	N=982,125	N=1,012,846	N=929,284	N=1,012,850	N=1,012,851	N=674,480	N=1,012,852

All models include the covariates listed in Table 1. Absolute values of the t-statistics are presented in parentheses. The model only includes those individuals who were observed for seven or more periods and excluded any transitions to Medicaid where assessments were not present for at least three quarters before and after the transition.

Table 5 (continued): Model of transition (T) to Medicaid from private-pay: Full Sample

<i>Period</i>	Urinary Infection	Wound Infection	Falls	Depression
T-3+	0.014 (2.20)	0.003 (1.10)	0.032 (4.04)	-0.008 (1.48)
T-2	0.008 (1.19)	0.002 (0.92)	0.023 (2.82)	0.0003 (0.05)
T-1	0.007 (1.11)	0.003 (1.07)	0.016 (2.03)	0.004 (0.74)
T	0.005 (0.81)	-0.00001 (0.00)	0.017 (2.19)	0.009 (1.56)
T+1	0.007 (1.15)	-0.0005 (0.19)	0.014 (1.78)	0.015 (2.50)
T+2	0.006 (0.89)	0.0002 (0.07)	0.004 (0.53)	0.017 (2.84)
T+3+	0.006 (0.97)	0.002 (0.72)	0.011 (1.38)	0.014 (2.52)
	N=1,012,850	N=1,012,850	N=1,012,840	N=1,012,364

All models include the covariates listed in Table 1. Absolute values of the t-statistics are presented in parentheses. The model only includes those individuals who were observed for seven or more periods and excluded any transitions to Medicaid where assessments were not present for at least three quarters before and after the transition.

Table 6: Model of transition (T) to Medicaid from private-pay: Observed from Admission

<i>Period</i>	Pain	Pressure Ulcers	Physical Restraints	Incontinence	Catheters	Bedfast	Anti- psychotics	Feeding Tubes
T-3+	0.013 (1.39)	0.020 (2.53)	0.006 (0.91)	0.006 (0.63)	0.012 (2.32)	0.019 (4.05)	-0.011 (0.90)	-0.004 (1.16)
T-2	0.006 (0.69)	0.014 (1.73)	0.004 (0.63)	0.010 (1.05)	0.007 (1.47)	0.013 (2.69)	-0.011 (0.88)	-0.001 (0.22)
T-1	0.008 (0.91)	0.014 (1.77)	0.007 (1.08)	0.008 (0.84)	0.008 (1.63)	0.012 (2.51)	-0.009 (0.74)	-0.004 (1.04)
T	-0.0001 (0.01)	0.010 (1.25)	0.004 (0.66)	0.007 (0.76)	0.008 (1.64)	0.012 (2.62)	-0.011 (0.91)	-0.008 (2.22)
T+1	0.004 (0.46)	0.010 (0.82)	0.010 (1.49)	0.015 (1.58)	0.008 (1.52)	0.010 (2.10)	-0.008 (0.67)	-0.008 (2.26)
T+2	-0.0004 (0.05)	0.010 (0.83)	0.006 (0.96)	0.017 (1.75)	0.005 (0.99)	0.009 (1.80)	-0.003 (0.27)	-0.008 (2.45)
T+3+	-0.0004 (0.44)	0.010 (1.25)	0.008 (1.21)	0.017 (1.84)	0.007 (1.50)	0.013 (2.74)	-0.003 (0.27)	-0.009 (2.75)
	N=388,615	N=388,639	N=418,595	N=382,123	N=418,598	N=418,599	N=243,498	N=418,600

All models include the covariates listed in Table 1. Absolute values of the t-statistics are presented in parentheses. The model only includes those individuals who were observed for seven or more periods and excluded any transitions to Medicaid where assessments were not present for at least three quarters before and after the transition

Table 6 (continued): Model of transition (T) to Medicaid from private-pay: Observed from Admission

<i>Period</i>	Urinary Infection	Wound Infection	Falls	Depression
T-3+	0.022 (2.34)	0.001 (0.15)	0.041 (3.52)	-0.006 (0.75)
T-2	0.018 (1.87)	0.001 (0.29)	0.026 (2.21)	0.011 (1.25)
T-1	0.020 (2.11)	0.002 (0.52)	0.020 (1.70)	0.013 (1.49)
T	0.017 (1.78)	-0.002 (0.43)	0.018 (1.58)	0.019 (2.27)
T+1	0.019 (2.02)	-0.003 (0.79)	0.020 (1.73)	0.025 (2.94)
T+2	0.013 (1.44)	-0.001 (0.38)	0.006 (0.55)	0.025 (2.98)
T+3+	0.016 (1.73)	0.0004 (0.12)	0.019 (1.60)	0.021 (2.52)
	N=418,600	N=418,600	N=418,592	N=418,452

All models include the covariates listed in Table 1. Absolute values of the t-statistics are presented in parentheses. The model only includes those individuals who were observed for seven or more periods and excluded any transitions to Medicaid where assessments were not present for at least three quarters before and after the transition

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