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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 also test the robustness of these results across states with different Medicaid and private-pay rate differentials. Across our various identification strategies, the results generally support the idea that quality is a public good within nursing homes. That is, within a common nursing home, there is very little evidence to suggest that Medicaid-funded residents receive consistently lower quality care relative to their private-paying counterparts.

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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). In assessing the impact of payer source on nursing home treatment quality, researchers have basically assumed that poor quality for Medicaid recipients is a cross-facility phenomenon. The research community has 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 legal, behavioral 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 U.S. General Accounting Office (1990) has received reports of the segregation of Medicaid and private-pay residents within a nursing home. From a behavioral perspective, there is a long-standing notion that professional norms matter in health care (Arrow, 1963). Behavioral constructs such as trust, fairness and regret may explain why providers put a value on treating all patients according to the same criteria (Frank, 2004). Finally, 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 must ensure the joint care of Medicaid and private-pay residents in a common facility. Historically, most states have used certificate of need (CON) 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.

Given the joint care of private-pay and Medicaid patients in many facilities, early economic analyses of the nursing home industry routinely assumed uniform quality across payer types. Building from this assumption, an influential literature has argued that—in the context of a binding CON law—an increase in Medicaid payment rates should increase the share of Medicaid patients and thereby lower quality for all patients (Nyman, 1988b; Gertler, 1989). More recent work has argued that this finding does not generalize to today's nursing home market (Grabowski 2001). One unresolved issue that may explain the different results across these studies is the validity of the uniform quality assumption. Somewhat surprisingly, however, there has been virtually no empirical work examining whether nursing home quality is a public good.

This lack of previous work on this topic likely reflects the 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 provide the first careful exploration of this question 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 have identified seven states from this national repository with accurate quarterly payer source information over time. We have access to twelve process and outcome based indicators of nursing home quality over time, allowing for a comprehensive analysis of quality of care.

With this unique individual level panel of nursing home data, we consider several alternative models of the relationship between payer source and quality. We begin with a cross-sectional model relating quality to payer source. Such a model suffers from two-sided selection, however: homes with more Medicaid patients may be of different quality for unobserved reasons; and patients who are on Medicaid may be differentially sick for unobserved reasons. We attempt to address both of these concerns by including fixed effects for both nursing homes, and then also for individuals. This latter model is therefore identified by the "spend down" from private-pay to Medicaid status for individual residents, and compares 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.

Ultimately, across all three models, we find strong support for the public good assumption: quality of care is no lower for Medicaid patients within nursing homes. We assess

the sensitivity of our findings to a variety of specification tests, including the use of differences in Medicaid rate differentials across states to control for selection, and find them quite robust. Thus, nursing home care does in fact appear to be a public good.

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

[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).

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 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). Although Chandra and Skinner posit that cross-facility variation likely dwarfs within-facility variation in many health applications, there is evidence that within-facility variation matters in the hospital context (Gruber, 2000). For example, Hadley and colleagues (1991) compared the treatment of insured and uninsured patients in the hospital, and they found that fewer resources were used in the care of the uninsured. Specifically, the uninsured were 29% to 75% less likely to undergo each of five high-cost or high-discretion procedures. Currie and Gruber (2001) found that expansions in the Medicaid program differentially affected the hospital treatment of privately insured and Medicaid insured patients. Finally, Gruber, Kim and Mayzlin (1999) found that higher Medicaid fee differentials for cesarean section delivery were associated with higher rates of cesarean delivery among Medicaid patients. They estimated that as much as one-half of the sizable difference in cesarean rates across Medicaid and private-pay patients was due to differential payment rates.

Both within-facility and cross-facility 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 (U.S. 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 scant research 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.

Since beginning our work on this topic, a paper was published addressing cross-facility and within-facility variation in nursing home mortality. 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. Among the papers in the literature, the Troyer study most closely approximates our own approach. However, there are some significant limitations of this paper that merit mention. Because mortality is an extreme outcome that may not be responsive to quality differences, it has not been included as a potential quality indicator in the recent validation efforts by CMS (Morris et al., 2003). In fact, CMS excluded those residents "near death" from the denominator in calculating other quality indicators. Part of the problem with using mortality as an indicator of quality is measurement error in that private-pay patients may disproportionately return home prior to death while Medicaid patients may be disproportionately hospitalized prior to death (Freiman and Murtaugh, 1993; Weissert and Scanlon, 1985). In this paper, we employ a range of validated quality indicators to test the public good hypothesis. It is also important to note that the Troyer paper does not employ individual fixed effects, and because it is a single-state study, it cannot exploit variation in Medicaid policy across states. Our study is able to employ both nursing home and individual fixed effects and exploit cross-state variation in the Medicaid rate-private pay fee differentials.

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, $[\,\overline{x} - x(p,q)\,]$ where $\overline{x}$ 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 $\overline{x}$. Thus, the nursing home takes the Medicaid payment rate (r) and its own bed supply ($\overline{x}$) as givens, and chooses the private price and a uniform level of quality to maximize profits:

$$\max_{p,q} \pi = px(p,q) + r(\overline{x} - x(p,q)) - c(q \mid \overline{x}). \qquad (1)$$

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:

$$\pi_p = (p - r)x_p + x = 0, \tag{2}$$

$$\pi_q = (p - r)x_q - c_q = 0. \tag{3}$$

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; Nyman, 1985). Nursing homes are assumed to compete for private patients on the basis of quality and price, but because of the excess demand assumption, homes do not need to compete for Medicaid patients on the basis of quality. As state Medicaid programs raise their reimbursement levels, homes on the margin will want more Medicaid patients, which entails fewer private-pay patients due to the binding bed constraint. Because quality is a public good, an increase in Medicaid payment lowers overall facility-level quality. The early research in this area found empirical support for this hypothesis using cross-sectional data in a single state from the late 1970s and early 1980s. The quality measures used in this literature included staffing and nursing home violations. However, recent empirical work has argued that the earlier finding does not generalize to national data, more recent data, longitudinal data or outcome quality measures (Grabowski, 2001; 2004).

Moreover, because the early work in this area used facility-level staffing and violations, it was impossible to test the uniform quality assumption. Indeed, one explanation for the different

findings in the Medicaid payment-quality literature is the public good assumption, the key assumption of the early literature.

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:

$$\frac{dp}{dm} = -\frac{dp}{dx} > 0, \tag{4}$$

$$\frac{dq}{dm} = -\frac{dq}{dx} < 0. \tag{5}$$

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. Thus, for policy analysis, it is central to evaluate the validity of the common quality assumption that drives these types of conclusions.

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 a 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 use ancillary Medicare payments (categories iii and iv) in the assignment to payer groups. 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 whether they faced some co-payment (viii). Finally, we created an

[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.

other payer group for individuals in CHAMPUS (category v), VA (category vi) and other (category x).

There is no single preferred measure of nursing home quality in the MDS data, so we have formed 12 indicators of quality based on the available information (U.S. General Accounting Office, 2002). By examining patterns for all 12 indicators, we hope to assess most generally whether quality is a common good.

Our quality measures consist of five "process" based measures and seven "outcome" based measures of quality. The process based measures are:

- *The presence of a physical restraint*: immobility resulting from the use of physical restraints may increase the risk of pressure ulcers, depression, mental and physical deterioration, and mortality (Zinn, 1993).
- *Use of an indwelling catheter*: urethral catheterization places the resident at greater risk for urinary tract infection; other long-term complications include bladder and renal stones, abcesses, and renal failure.
- *Bedfast*: although many residents are bedfast due to medical conditions, bedfast residents are at a higher risk of developing pressure ulcers and other complications.
- *Use of a feeding tube*: feeding tubes can result in complications including self-extubation, infections, aspiration, unintended misplacement of the tube, and pain.
- *The use of anti-psychotics*; overuse of anti-psychotics may result in mental and physical deterioration (Harrington et al, 1992).

The outcome based measures are:

- *Pressure ulcers:* 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 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).
- *Bowel or bladder incontinence*: 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).
- *Urinary tract infections* and *wound infections*: infections occur frequently among nursing home residents with the potential for significant morbidity and mortality (Nicolle, 2000).
- *Presence of a fall* over the 30 days prior to the assessment: 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).
- *Depression:* 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 analyses, we included 24 dummy variables in our regressions. 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. With these dummy variables in our regressions, it is important to note that we are not simply identifying length of stay effects, but true transition effects. Specifically, we created a dummy variable to approximate length of stay for each quarter up through 10 years in the nursing home. The final dummy variable measures length of stay greater than 10 years. Thus, we have 40 dummy variables to model length of stay. Finally, we also included a number of demographic variables including age, gender, 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.

INSERT TABLE 2 HERE

Empirical Strategy

We pursue a variety of empirical specifications designed to determine whether Medicaid patients are treated in a systematically different fashion than non-Medicaid patients. We begin by estimating cross-sectional models of the form:

$$Y_{int} = \alpha + \beta_1 OTHER_{int} + \beta_2 MEDICAID_{int} + \delta X_{int} + \gamma Z_{nt} + \alpha_t + \varepsilon_{int} \qquad (6)$$

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, and ε_{int} is the randomly distributed error term. 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.

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

As noted in the introduction, models such as (6) will be biased due to both unobserved facility and individual characteristics. Our second specification deals with the first of these problems by including nursing home fixed effects (λ_n):

$$Y_{int} = \alpha + \beta_1 OTHER_{int} + \beta_2 MEDICAID_{int} + \delta X_{int} + \gamma Z_{nt} + \alpha_t + \lambda_n + \varepsilon_{int} \quad (7)$$

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. Thus, Equation (7) deals with the first type of selection identified above, that homes with a higher share of Medicaid may be ones that treat their patients worse for other reasons.

Although this fixed-effects specification 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 both nursing home choice and outcomes. Thus, we next estimate models of the following form:

$$Y_{int} = \alpha + \beta_1 OTHER_{int} + \beta_2 MEDICAID_{int} + \delta X_{int} + \gamma Z_{nt} + \alpha_t + \mu_i + \varepsilon_{int} \quad (8)$$

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.[4] That is, this model controls for fixed but unobservable characteristics of both nursing homes and patients, allowing us to ask: does treatment quality change when patients change payer source?

There are two potential problems with this empirical framework, however. The first is the potential endogeneity of payer status and quality. There may exist unobserved, time-varying

[4] Person fixed effects will subsume home fixed effects for patients who do not move between homes. However, the overall transfer rate per year at risk has been estimated at 3.3% (Hirth et al, 2003), so this is not a large issue. If we include home fixed effects as well as the patient fixed effects in these models, the results are unchanged.

factors that are correlated with both payer status and quality, for example if somehow negative health shocks lead individuals to switch to Medicaid. We address this concern in two ways below. First, we explicitly model observable patient health as a function of payer status, to see if there is a correlation with a measurable source of selection. We find that, once patient fixed effects are included, such correlation is quite small. Second, we provide estimates that exploit cross-state variation in the difference between Medicaid payment rates and private-pay prices (see Table 2). In both the facility (eq. 7) and individual (eq. 8) fixed effects models, we incorporate both a fee ratio, which is the average state Medicaid payment rate divided by the average state private-pay price, and an interaction term between this fee ratio and Medicaid status. If Medicaid residents receive lower quality than their private-pay counterparts, this effect should be largest in states with the greatest difference between the private-pay price and the Medicaid payment rate; where this fee differential is zero, there should be no quality difference. This model is free of selection as long as any bias from time-varying unobserved variables is equally important in high and low differential homes/states.

The other problem with equation (8) is that it captures a specific type of payer source change, the spend-down from private pay to Medicaid. It is possible that patients who are admitted from the start as Medicaid are treated worse than those who are private pay, but that when private pay patients transition to Medicaid their treatment does not change (for example because the nursing home has already established a treatment regime). That is, by identifying our models from transitions, we may miss important elements of nursing home discrimination that apply only to those admitted under different payer statuses, not those who transition across payer status.

There is no way to both address this problem *and* control for unobserved patient

characteristics. However, we can determine the magnitude this problem by focusing solely on new nursing home admissions (i.e., individuals admitted in the 4th quarter of 1998 or later), and estimating the model as a function of payer status at admission. We present results from this approach below.

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. Because we have multiple observations on each individual, standard errors are clustered at the level of the individual.

III. Basic Results

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, even when our standard errors are corrected for individual-level correlation across quarters.

INSERT TABLE 3 HERE

The first column of results excludes fixed-effects and is identified solely by cross-sectional variation in payer source and quality. The first five rows present the process-based

quality measures; the next seven rows show the outcome-based quality measures.

The results from this cross-sectional model are surprisingly mixed: contrary to expectations, we do not find clear evidence of lower quality for Medicaid patients, even without controlling for home or person fixed effects. For the process measures, three are positive, indicating worse quality for Medicaid patients (restraints, anti-psychotics, and feeding tubes), although only one (anti-psychotics) is significant; two are negative, indicating better quality for Medicaid patients (catheters, bedfast), and both are significant. For the outcome measures, three are positive, indicating worse quality for Medicaid patients (pain, incontinence, and depression), while four are negative, indicating better quality for Medicaid patients (pressure ulcers, urinary infection, wound infection, and falls); all are significant. These mixed findings are surprising given the general presumption that Medicaid patients are treated worse in nursing homes.

The effects, however, are uniformly very small. The only effects that amount to more than 10% of the baseline means in Table 1 are catheters (-11%), wound infections (-20%), and falls (-14%). Given this pattern, the weight of the evidence actually appears to point towards *better* quality for Medicaid patients. But the overall pattern is one of small and inconsistent effects.

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, so that we are comparing the treatment of Medicaid and non-Medicaid patients within the same facility. The results are remarkably similar to those without home fixed effects. Indeed, if anything, there is even more evidence of a positive treatment of Medicaid patients in this model, as the two process measures which were insignificant and positive (restraints and feeding tubes) are now negative and (at least marginally) significant. But the results remain

small overall, and once again mixed, with positive coefficients (negative quality) on important measures such as pain, incontinence, and depression.

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). These results have shifted slightly from the results including home fixed effects, but they present a similar story: mixed evidence that, if anything, suggests *higher* quality for Medicaid patients. Once again, the results remain small in magnitude. The estimates that amounted to more than 10% of their baseline values were catheters (-15%), feeding tubes (-10%), pressure ulcers (-12%), urinary infections (-14%), wound infections (-20%) and falls (-12%). Put alternatively, the estimated coefficients in column 3 were each less than 6% of a standard deviation of the dependent variable means.

In sum, the 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.

IV. Addressing Selection and Locality of Treatment Effects.

The inclusion of both nursing home and patient-level fixed effects in our models should, in principle, address selection problems. However, it remains possible that patients are becoming unobservably sicker, or even healthier, around the time of transition to Medicaid. This could bias our results in the direction of finding negative, or positive, effects of Medicaid on quality. In addition, as discussed earlier, our models with patient fixed effects are identified only from transitions, and it is possible that there is differential treatment of Medicaid patients upon

arrival that is not present when they transition. This is the problem of "local average treatment effects", whereby our estimates reflect the true answer for a particular population but not for others.

We address these two issues in this section of the paper. First, we assess whether selection appears to be a problem by examining observable indicators of health to see if they are correlated with transitions to Medicaid payer status. We then turn to using rate differentials across states to add extra identification to the model. Finally, we consider models that focus just on payer status at admission to assess whether there is differential treatment based on initial payer.

Selection on Observables

The inclusion of fixed effects in our models is designed to capture home and individual-based selection that might bias our quality estimates. Whether these strategies are successful is unknowable, but we can get some perspective on this issue by looking at observable correlates of selection. As argued formally by Altonji and Taber (2000), if observables are sufficiently predictable of unobservables, then assessing the correlation of the variable of interest with observables can provide some indicator of the potential bias from omitting unobservables. In our context, the unobservable of most interest is health, and we have an excellent observable indicator of health: measures of activities of daily living.

We therefore reestimate each of our models where the dependent variable, quality, is replaced with the ADL index described earlier, which takes on values of 0-24. Obviously, in these models we exclude the 24 ADL index dummies from the regression. We then assess

whether our Medicaid indicator is correlated with the ADL index in each of our specifications, and whether the correlation is substantively large enough to likely bias our estimates.

The results of this exercise are shown in Table 4. For models without home/person fixed effects, there is a very large and significant negative correlation between Medicaid status and observed health: Medicaid patients are in worse health. The results show that being on Medicaid is associated with a reduction in ADL score of 0.384, relative to a mean score of 14.4. This suggests that, if anything, our results without home/person fixed effects are biased *in favor of* finding low quality for Medicaid patients, making the mixed results in that model even more striking.

When we include home fixed effects in the second column, the coefficient does not change much: there remains a strong negative correlation with the ADL score (actually even stronger than in the first column). The results change significantly in the third column. However, when person fixed effects are included: there is now a small *positive* correlation with Medicaid. That is, this model indicates that individuals are, along observable dimensions, becoming healthier when they transition to Medicaid. This is indicative of selection which biases in our favor, even in the patient fixed effects models. The effect is very small, however, and amounts to only 0.5% of the sample mean; it is only significant because of the enormous size of our sample.

We can confirm this point by assessing how large any selection effects are relative to our earlier estimates. We do this by (a) running regressions of each quality measure on the ADL score, (b) multiplying the coefficients from this regression times the 0.065 coefficient from this home/person fixed effects regression, and (c) dividing the resulting product by the Medicaid coefficient reported in Table 3. That is, this exercise asks: given how much health matters for

quality, and given the selection effects we see for health, how large a bias does that cause for the quality measures?

Not surprisingly given the small selection coefficient in the person fixed effects model, we get relatively little predicted bias from this exercise. Over all our quality measures, the predicted bias is less than 5%, and for only one measure (incontinence) does it exceed 10%. Thus, the selection effects based on observables are quantitatively small. This does not rule out selection on unobservables, but it does suggest such selection might be small.

Rate Differential Results

As noted in Table 2, there is some variation across states in the Medicaid rate-private pay price differential. Given potential concerns with the endogeneity of payer status and quality, we used the payment differential as an exogenous source of variation across states. Thus, we tested whether quality differences between private-pay and Medicaid residents were greatest in those states with the largest differential between the private-pay price and Medicaid rate. The key coefficient of interest is the interaction of a state's Medicaid-to-private rate ratio with an individual's Medicaid status. If lower Medicaid reimbursement is leading to worse treatment of Medicaid patients, then as the rate differential increases towards one (i.e., equal payment for private-pay and Medicaid), we would expect less difference in quality across Medicaid and private-pay patients (thus, negative coefficient estimates).

Table 5 presents the coefficients of interest from this specification for our patient fixed effects model. There is very little support for the idea that quality is worse in those states with a greater payment differential. In fact, most of the estimated coefficients indicate the opposite effect. Only four of the fee interaction coefficients are negative, and only those for restraints,

incontinence and depression are significant. Strikingly, these are the same outcomes for which the main effects on Medicaid status are positive: that is, for these outcomes, quality worsens when individuals transition to Medicaid, and less so when the Medicaid payment differential is smaller. So it is possible that there is some effect of higher Medicaid rates in improving outcomes in these areas. Overall, however, the pattern does not indicate that increased Medicaid rates lead to better outcomes, consistent with our earlier findings. Given the range of different outcomes examined in this table, this evidence is fairly weak in support of quality as a private good.

Local Treatment Effects

The other major concern discussed earlier was that, although including person fixed effects deals with selection problems in these regressions, it captures only a particular source of the variation in treatment, that due only to treatment changes as individuals transition to Medicaid. It is possible that there could be no change in treatment when individuals make such a transition, while still being discriminatory in the treatment of patients who arrive as Medicaid. That is, the local treatment effect we estimate from this group of switchers may not represent the true effects of Medicaid status on treatment.

To address this concern, we replace our measure of payer status with a measure based on initial payer status on admission (see Table 6). That is, we are not comparing those who changed status in these models, but rather comparing individuals based on what they were labeled when they entered the home. Obviously, in this case, we cannot include person-specific fixed effects, so Table 6 shows only models with no fixed effects and home-specific fixed effects.

In fact, the results are strikingly similar to our earlier findings: by and large positive association between Medicaid and quality (negative coefficients), with some negative effects (positive coefficients) for incontinence, anti-psychotics, and depression. Once again, all of the coefficients are very small, suggesting no effect in aggregate even the model is identified based on those who switch payer status.

V. Conclusions

Using a variety of identification strategies, the results in this paper confirm the common presumption that nursing home quality is a public good. Specifically, we employed models identified by within-facility and within-person variation in payer status and quality; we showed that selection on observable dimensions is small; we exploited cross-state variation in the Medicaid and private-pay rate differential as an additional source of variation; and we considered individuals solely based on payer status at admission. In every case, there was no consistent finding of differential quality for Medicaid patients, and the coefficients of either sign were universally quite small. 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 in the nursing home literature (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. Although there is evidence that quality is often a private good in the physician and hospital

sectors, researchers have also found support for the public good assumption across Medicaid and non-Medicaid patients in hospitals (Dranove and White, 1998).

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. However, 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
Physical Restraints	0.09	0.28	0.07	0.26
Catheters	0.08	0.26	0.09	0.29
Bedfast	0.06	0.23	0.05	0.22
Feeding Tubes	0.07	0.25	0.06	0.24
Anti-psychotics	0.19	0.39	0.21	0.41
Pressure Ulcers	0.08	0.27	0.09	0.28
Pain	0.13	0.34	0.14	0.35
Incontinence	0.54	0.50	0.46	0.50
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
Female	0.71	0.46	0.68	0.47
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 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	Adjusted Ratio
Kansas	1998	357	78.94	84.82	0.93	0.93
	1999	356	85.55	92.48	0.93	0.93
	2000	349	92.78	99.48	0.93	0.93
	2001	344	98.02	106.71	0.92	0.92
	2002	325	101.10	109.00	0.93	0.93
Maine	1998	133	107.88	142.55	0.76	0.75
	1999	131	112.53	148.22	0.76	0.75
	2000	124	117.68	155.59	0.76	0.75
	2001	117	127.63	162.86	0.78	0.76
	2002	118	131.73	169.30	0.78	0.76
Mississippi	1998	183	85.82	86.89	0.99	0.99
	1999	184	90.32	93.69	0.96	0.96
	2000	182	99.26	100.98	0.98	0.98
	2001	193	108.32	100.75	1.08	1.08
	2002	185	112.91	108.30	1.04	1.04
North Dakota	1998-1999	81	104.28	102.22	1.02	1.01
	1999-2000	79	109.49	106.84	1.02	1.01
	2000-2001	79	127.03	123.67	1.03	1.02
	2001-2002	79	134.34	130.81	1.03	1.02
	2002-2003	78	132.39	128.69	1.03	1.01
Ohio	1998	719	114.95	135.25	0.85	0.85
	1999	671	117.71	140.48	0.84	0.84
	2000	731	123.34	143.05	0.86	0.86
	2001	836	134.43	150.54	0.89	0.89
	2002	811	149.36	156.06	0.96	0.96
South Dakota	1998-1999	106	79.42	99.61	0.80	0.80
	1999-2000	106	81.46	103.85	0.78	0.78
	2000-2001	106	85.53	106.67	0.80	0.80
	2001-2002	108	96.63	123.07	0.79	0.79
	2002-2003	110	100.60	129.46	0.78	0.78
Washington	1998	264	118.16	145.74	0.81	0.81
	1999	262	125.40	147.96	0.85	0.85
	2000	256	137.43	160.67	0.86	0.86
	2001	260	142.86	171.84	0.83	0.83
	2002	258	149.01	178.79	0.83	0.83

Notes: The rates are weighted by the total number of payer type days within each facility. 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. The "adjusted ratio" column accounts for resident acuity across private-pay and Medicaid resident.

Table 3: Medicaid and Nursing Home Quality: Total Sample

Outcomes	No Fixed Effects (1)	With Nursing Home Fixed Effects (2)	With Person Fixed Effects (3)
Physical Restraints	0.0001	-0.003	0.006
(N=1,564,820)	(0.14)	(2.60)	(3.85)
Catheters	-0.009	-0.008	-0.012
(N=1,564,836)	(10.85)	(8.83)	(11.81)
Bedfast	-0.001	-0.001	-0.005
(N=1,564,841)	(2.17)	(1.46)	(5.33)
Feeding Tubes	0.0001	-0.002	-0.007
(N=1,564,833)	(0.13)	(1.80)	(9.18)
Anti-psychotics	0.014	0.009	0.004
(N=892,578)	(7.13)	(4.23)	(1.85)
Pressure Ulcers	-0.006	-0.005	-0.010
(N=1,380,289)	(7.94)	(6.89)	(6.80)
Pain	0.008	0.007	-0.009
(N=1,380,127)	(6.86)	(5.91)	(4.92)
Incontinence	0.018	0.018	0.013
(N=1,422,656)	(12.13)	(12.67)	(6.33)
Urinary Infections	-0.006	-0.005	-0.012
(N=1,564,825)	(8.07)	(6.70)	(8.33)
Wound Infections	-0.004	-0.003	-0.004
(N=1,564,825)	(12.27)	(10.18)	(6.27)
Falls	-0.022	-0.021	-0.019
(N=1,564,786)	(24.40)	(21.96)	(9.95)
Depression	0.039	0.032	0.022
(N=1,563,566)	(17.98)	(14.64)	(11.23)

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: Selection on Observables: Total Sample

Outcome	No Fixed Effects (1)	With Nursing Home Fixed Effects (2)	With Person Fixed Effects (3)
ADL Index	-0.384	-0.445	0.065
(N=1,565,017)	(13.51)	(15.6)	(2.85)

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: Effect of rate differential on nursing home quality: Total Sample

Outcomes	Medicaid	Rate Differential	Medicaid × Rate Differential
Physical Restraints	0.044	0.147	-0.044
(N=1,545,271)	(2.77)	(6.60)	(2.47)
Catheters	-0.059	-0.013	0.053
(N=1,545,285)	(5.48)	(0.90)	(4.40)
Bedfast	-0.008	0.037	0.004
(N=1,545,290)	(0.89)	(2.87)	(0.39)
Feeding tubes	-0.075	0.070	0.076
(N=1,545,284)	(9.09)	(6.21)	(8.32)
Anti-psychotics	0.018	0.068	-0.016
(N=886,339)	(0.64)	(1.60)	(0.49)
Pressure ulcers	-0.035	-0.018	0.029
(N=1,366,262)	(2.40)	(0.93)	(1.76)
Pain	-0.032	0.090	0.026
(N=1,366,104)	(1.73)	(3.63)	(1.28)
Incontinence	0.096	0.109	-0.095
(N=1,405,839)	(4.45)	(3.70)	(3.91)
Urinary infections	-0.053	0.008	0.046
(N=1,545,278)	(3.51)	(0.42)	(2.71)
Wound infections	-0.019	-0.011	0.017
(N=1,545,278)	(3.05)	(1.32)	(2.44)
Falls	-0.176	-0.052	0.178
(N=1,545,236)	(8.78)	(1.96)	(7.89)
Depression	0.082	0.150	-0.068
(N=1,544,080)	(3.73)	(4.92)	(2.75)

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

Table 6: Payer Source at Time of Admission and Quality

Outcomes	No Fixed Effects (1)	With Nursing Home Fixed Effects (2)
Physical Restraints	-0.002	-0.004
(N=837,037)	(1.39)	(3.03)
Catheters	-0.018	-0.014
(N=837,040)	(14.94)	(10.69)
Bedfast	-0.005	-0.005
(N=837,048)	(6.66)	(5.83)
Feeding tubes	-0.018	-0.017
(N=837,045)	(15.40)	(13.84)
Anti-psychotics	0.030	0.020
(N=375,414)	(9.22)	(6.30)
Pressure ulcers	-0.017	-0.016
(N=654,646)	(15.02)	(14.45)
Pain	-0.006	-0.005
(N=654,613)	(3.60)	(2.99)
Incontinence	0.019	0.020
(N=750,918)	(9.33)	(9.77)
Urinary infections	-0.011	-0.010
(N=837,030)	(11.43)	(9.96)
Wound infections	-0.005	-0.050
(N=837,030)	(12.12)	(10.37)
Falls	-0.017	-0.016
(N=836,992)	(13.16)	(12.01)
Depression	0.024	0.021
(N=836,186)	(8.21)	(7.06)

The coefficient estimates reported are the interaction of the case-mix adjusted rate differential (Medicaid divided by private-pay) and Medicaid status. All models include the covariates listed in Table 1 along time fixed effects. Absolute values of the t-statistics are presented in parentheses

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