Nursing Home Performance Under Case-Mix Reimbursement: Responding to Heavy-Care Incentives and Market Changes

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Objective. To examine the effect of case mix—adjusted reimbursement policy and market factors on nursing home performance.

Data Sources and Study Setting. Data from Medicaid certification inspection surveys, Medicaid cost reports, and the Kentucky State Center for Health Statistics for the years 1989 and 1991, to examine changes in nursing home performance stemming from the adoption of case mix—adjusted reimbursement in 1990.

Study Design. In addition to cross-sectional regressions, a first-difference approach to fixed-effects regression analyses was employed to control for facility differences that were essentially fixed during the survey years and to estimate the effects of time-varying predictors on changes in facility expenditures, efficiency, and profitability.

Principal Findings. Facilities that increased the proportion of Medicaid residents and eliminated excess capacity experienced higher profitability gains during the beginning phase of case-mix reimbursement. Having a heavy-care resident population was positively related to expenditures prior to reimbursement reform, and it was negatively related to expenditures after the case-mix reimbursement policy was introduced. While facility-level changes in case mix had no reliable influence on costs or profits, nursing homes showing an increased prevalence of poor-quality nursing practices exhibited increases in efficiency and profitability. At the market level, reductions in excess or empty nursing home beds were accompanied by a significant growth in home health services. Moreover, nursing homes located in markets with expanding home health services exhibited higher increases in costs per case-mix unit.

Conclusions. Characteristics of the reimbursement system appear to reward a cost minimization orientation with potentially detrimental effects on quality of care. These effects, exacerbated by a supply-constrained market, may be mitigated by policies that encourage the expansion of home health service availability.

Key Words. Case-mix reimbursement, excess demand, home health services

Case-mix reimbursement systems are intended to eliminate incentives that discourage nursing homes from admitting heavy-care Medicaid patients by varying the reimbursement rate with the patient's condition (Rosko, Boyles, and Aaronson 1987). Reimbursement policy that is responsive to differences in patient care needs should improve equity among nursing homes by paying more to facilities whose higher costs stem from the selection of heavier-care patients rather than from inefficiency (Feder and Scanlon 1989). Although a review of the reimbursement systems in 11 states concluded that case-mix payment increases heavy-care access as well as system costs (Weissert and Musliner 1992), relatively few empirical studies have examined nursing home performance under case-mix reimbursement.

In a study of Minnesota's case-mix reimbursement system, Nyman and Connor (1994) found a discrepancy between the estimates of marginal costs of different patient types and their corresponding reimbursement rates. Consequently, some patient types were more profitable than others. Further analyses revealed that nursing homes responded to these profitability differences by increasing or decreasing case-mix days for different patient types. Thorpe, Gertler, and Goldman (1991) examined the effects of New York's case-mix reimbursement system on growth in facility costs. Both the percentage of Medicaid patients and the nursing home's "corridor position" in the reimbursement system were significant predictors of cost growth. Specifically, homes with increases in the proportion of Medicaid patients and financially constrained facilities (i.e., nursing homes with prior-year costs above the ceiling reimbursement rate) experienced smaller increases in cost growth.

At least 22 states have developed or are considering case-mix adjustment systems (Weissert and Musliner 1992). Market conditions are likely to affect the ways in which nursing homes respond and adapt to the introduction of case-mix reimbursement policy. Hence, this investigation examines the effect of case-mix reimbursement in the context of two diverging market influences: decreasing competitive pressure stemming from underbedded nursing home markets (Scanlon 1980; Nyman 1988) and increasing competition due

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to significant growth in home health service availability (Silverman 1990). Specific empirical questions about the effects of case-mix reimbursement include these: (1) To what extent do differences and changes in market demand influence nursing home costs, efficiency, and profitability? (2) How does the availability of home health services affect facility costs, efficiency, and profitability? and (3) To what degree are differences and changes in facility case mix and facility quality related to these nursing home outcomes?

MARKET-LEVEL EFFECTS ON PERFORMANCE

Excess Demand Markets

In general, the reimbursement policies as well as the market characteristics of the nursing home industry encourage a cost-control orientation among facilities (Davis and Provan 1996). Nyman's (1988) excess demand theory asserts that facilities located in relatively less competitive (underbedded) markets spend less on patient care than do facilities in more competitive markets. Ostensibly, nursing homes in underbedded markets can reduce costs (and quality) with impunity because a surplus of potential residents is readily available to fill empty beds regardless of quality. This problem is exacerbated by certificate-of-need (CON) laws that limit new beds, despite evidence indicating that consumer demand for nursing home beds is increasing (Jazwiecki 1986).

According to Nyman (1990), imposing case-mix reimbursement in excess demand markets is unlikely to have any effect on quality because facilities need not increase quality to attract Medicaid patients. In fact, case-mix reimbursement may actually keep quality levels below what they would be under traditional reimbursement methods. As the Medicaid rate for a heavy-care resident begins to approach the private-pay rate, facilities that lose private-pay patients to more desirable homes will merely substitute a now equally profitable heavy-care Medicaid patient, who will gladly accept admittance at current service levels. Consequently, a cost-minimization emphasis is likely to prevail over a quality orientation.

In the absence of enforcement mechanisms, the extra payment stemming from case-mix systems need not be spent on heavy-care residents. Moreover, the presence of excess demand allows nursing homes to selectively choose the least costly heavy-care patients. This implies that facilities receiving payment through a case-mix reimbursement system in underbedded

markets will exhibit lower costs and greater efficiency (i.e., will spend less per case-mix unit). Similarly, reductions in market excess capacity over time should lead to lower cost growth among facilities located in those markets. Market excess demand notwithstanding, individual facilities able to eliminate any existing excess capacity (i.e., to increase occupancy rates) by attracting new residents should also see less cost growth.

Home Health Service Availability

Home health agencies constitute a substitute service and a competitive threat to nursing homes if they are able to absorb excess demand. In theory, home health agencies compete for light-care patients, who are preferred by nursing homes in the absence of adequate case-mix reimbursement. Any reduction in the pool of light-care patients will increase the proportion of more costly, heavy-care patients while reducing the overall numbers of potential patients seeking institutional care. Under these market conditions, facilities forced to compete for a smaller pool of patients may respond with quality improvements designed to attract a larger portion of the available light-care patients. Alternatively, nursing homes may simply opt to accommodate a larger proportion of the more costly heavier-care patients. Accordingly, one would expect nursing homes located in markets with extensive home health services to have higher costs than those located in markets with relatively less service availability. Further, nursing homes located in areas with expanding home health services should experience relatively greater cost increases than those located in markets with less growth in home health services.

FACILITY-LEVEL EFFECTS

In principle, facilities should increase access for heavy-care patients if the anticipated extra revenues from serving a more debilitated resident population are greater than the marginal costs of providing heavier care. An adjustment in case mix represents a particularly attractive strategic response for homes struggling to compete for light-care patients if the rates set for heavy-care patients lead to equal or greater profitability. Assuming that case-mix reimbursement adequately rewards facilities for accepting heavier-care patients, one should see an increase both in expenditures (due to the greater number of RNs and other staff members needed to handle greater patient care requirements) and in profitability for homes that institute positive changes in patient mix (i.e., accommodating heavy-care patients).

Despite increased revenues, reimbursement incentives that encourage access to more costly, heavy-care residents may invite nursing practices geared to expenditure minimization at the expense of quality. For example, facility staff may favor less burdensome practices such as physical restraint and urethral catheterization over higher-quality, labor-intensive nursing protocols for dealing with combative or incontinent patients. Hence, it is critical to assess whether an alteration in the pattern of nursing practices and facility quality is connected with changes in nursing home expenditures and profitability under case-mix reimbursement.

In the ensuing study, we analyze nursing home performance and the influence of market forces under case mix—adjusted reimbursement in the Commonwealth of Kentucky. Our analysis of reimbursement reform views performance from a facility perspective. In particular, using panel data before and after the introduction of case-mix reimbursement, we investigate both cross-sectional differences and those changes in facility characteristics and practices that relate to nursing home costs, efficiency, and margin. Our analysis incorporates two market factors that play a key role in the behavior of nursing homes: the supply of nursing home beds and the availability of home healthcare services.

SAMPLE AND EMPIRICAL MODEL

Data Sources

Data from Medicaid certification inspection surveys and Medicaid cost reports of 171 facilities in Kentucky for the years 1989 and 1991 were provided by the state's Cabinet of Human Resources. In addition, the Kentucky State Center for Health Statistics supplied data on occupancy rates, bed supplies, and home health services for each county in the state. After excluding personal care facilities and facilities with missing data, the final sample contained a total of 165 observations.

Model Specification and Operationalization

The typical regression approach modified to account for panel data assumes that the dependent measure is determined according to the following equation:

$$Y_{it} = X_{it}\beta + \alpha_I + \varepsilon_{it} \tag{1}$$

where i indexes facilities and t indexes years. In this study, Y is the per diem cost, cost per case-mix unit, or margin for each facility, and X is

the vector of predictors, which, according to the usual nursing home cost function literature, includes facility characteristics (e.g., number of beds, percentage of Medicaid residents) and various market variables (e.g., excess capacity, market concentration). Parameter α_i is the effect from unobserved characteristics that vary across facilities but are relatively constant over time (e.g., organizational culture). The ε_{it} is the random effect of unobserved variables that vary across facilities and time.

Given the brief time frame, a cross-sectional analysis of market and facility variables before and after the introduction of case-mix reimbursement may underestimate their actual effects on performance. For instance, insufficient variability in market bed supplies makes it difficult to capture the effects of excess demand. Similarly, the effects of nursing home quality are not readily discernible if most facilities have no code deficiencies. The use of panel data and first-difference fixed-effects estimators provides a means of capturing the effects by controlling the unobserved, but systematic effects of α_i on the dependent measure (Hsiao 1986). In addition, although some homes may not have altered their strategies in response to case-mix reimbursement during the time period of this study, it seems appropriate to examine the effects brought about by facilities that did change, especially in light of the short amount of time between the implementation of case-mix reimbursement and the time of this study. Those homes that had already altered their strategies may have pointed to the future direction of the nursing home industry under case-mix reimbursement. Accordingly, we removed the effects of latent unobserved variables by subtracting lagged variable values from each observation, as indicated in the following equation:

$$(Y_{it} - Y_{i,t-2}) = (X_{it} - X_{i,t-2})\beta_d + (\varepsilon_{it} - \varepsilon_{i,t-2}) \quad (2)$$

Hence, in the analysis presented here we will control for facility differences that were essentially fixed during the survey years, and will estimate the effects of time-varying predictors on changes in facility expenditures, efficiency, and margin.

Dependent Measures. Facility costs, efficiency, and margin are employed as dependent measures for six cross-sectional and three first-difference regression models. All three measures are per diem estimates. An efficiency measure, "cost per diem/case mix," was created on the basis of the state's operational definition of efficiency. The state's case-mix reimbursement policy currently rewards only the more efficient facilities with a reimbursement surplus that is equivalent to 10 percent of the difference between their estimated reimbursement rate and the maximum allowable reimbursement. To

be eligible for the reimbursement surplus, facilities must have a cost per case-mix unit that is less than 120 percent of the median cost per case-mix unit (computed for all Kentucky nursing homes). In effect, this formula encourages facilities to take on heavier-care patients if they can do so inexpensively. Margin was calculated by subtracting each facility's per diem costs from its Medicaid reimbursement rate, which covers routine facility costs offset by any miscellaneous revenue (e.g., the sale of supplies) and certain non-allowable costs (e.g., bad debt expense). As defined here, margin may be regarded as a conservative, albeit crude, estimate of profitability because it excludes any additional revenue from private-pay sources.

Predictors. Two variables measure nursing home market competition. First, the average number of empty beds per facility in the county where each home is located acts as a proxy for excess demand in this analysis. Similar measures have been used by Nyman (1988) to capture the relative need to compete for patients. In this instance, for example, homes located in counties in which all beds are occupied would have less need to compete than would homes located in counties with numerous empty beds, *ceteris paribus.* Second, the number of home health patients served in the county in which each home was located measures the availability of community-based nursing home substitutes.

The case-mix measure is generated from resident classification data submitted by each facility in the state as part of the requirements for Kentucky's Case Mix Assessment Reimbursement (CMAR) System. The CMAR measure is based on eight activities of daily living (ADLs), special nursing needs (e.g., intravenous medications), the presence of behavioral problems requiring staff intervention, and clinical monitoring. From these criteria flow resident classification weights ranging from 1.0 (low resource use) to 4.0 (high resource use). In effect, higher weights reflect greater resident dependence. Accordingly, each facility's average classification weight served as its case-mix score. In 1989, prior to implementing the new reimbursement policy, individual nursing homes conducted the assessments and calculations required to compute the facility's case-mix index. Subsequent assessments and calculations have been conducted on a quarterly basis by an independent agency contracted by the state. Despite being subject to audit, economic incentives to inflate may have influenced the 1989 assessments. Nursing homes may also have influenced independent assessment results by effectively managing patient documentation.

The annual patient discharges and the number of RNs per nursing home resident (RN staffing intensity) serve as proxies for patient acuity. Discharge

activity may denote patient dependence to the extent that patient turnover distinguishes facilities with more short-stay patients from those with residents in need of long-term chronic care (Bishop 1980). Although empirical studies indicate RN staffing intensity relates to greater severity of health conditions among residents (e.g., Zinn 1994), we were motivated to include this variable by regulatory changes requiring increased RN coverage for all facilities in the state. As such, the variable may operate as a structural indicator of resources consumed, rather than of case mix per se.

The study employs two measures of nursing home quality. Consistent with the work of Nyman and others (Davis and Freeman 1994), quality of care is quantified by the total number of Medicaid certification code deficiencies for each home. Although code deficiencies are regarded as outcome measures of quality, they largely represent the state's minimum requirements for care. In addition to deficiencies, five indicators—the facility drug error rate, psychotropic medication usage, the use of physical restraint, the prevalence of pressure ulcers, and urethral catheterization—are standardized and summed to form a composite measure of facility quality. While threshold levels of each indicator would be expected in most facilities, a comparatively high prevalence of these practices is arguably an indicator of poor-quality nursing care (Health Care Financing Administration 1991).

In addition to market, case-mix, and quality indicators, several facility characteristics common to other nursing home cost function studies are included in the analysis. The Medicaid reimbursement rate is included as a control variable to determine the proportion of each additional Medicaid dollar that is spent on patient care. The excess capacity of each facility (i.e., the number of empty beds) is used as a measure of each home's attractiveness. This variable is typically included to isolate the market-wide effects of excess capacity on expenditures from firm-specific effects. It also acts as a measure of occupancy rate (Nyman 1988). The percentage of Medicaid residents in each home provides a measure of customer mix. In general, homes with a higher percentage of Medicaid residents will have lower costs, because reimbursement rates are appreciably less than corresponding private-pay rates. Average costs and profits are assumed to vary with scale of output. Consistent with the health services cost—function literature, facility size becomes a measure of output. In addition, a squared term is used to detect any curvilinear relationship. Last, given previous research on the cost differences associated with ownership mode and chain-owned facilities (Holmes 1996), dummy variables representing for-profit status and chain ownership are assigned as control measures.

RESULTS

Descriptive Statistics

Means, standard deviations, and results of *t*-test calculations comparing mean values for each study year are listed in Table 1. Several changes are noteworthy. With respect to competitive conditions, the market indicators may reflect opposing trends. That is, the significant growth in home health services suggests increased market competition, whereas the reduction in market excess capacity can be construed as a lessening of the competitive pressure on nursing homes. Another possibility is that the homes have responded to cost pressures and the need for greater efficiency by focusing on finding available beds expeditiously. Along with market-level reductions in excess capacity, the average facility significantly reduced existing excess capacity between 1989 and 1991. For the average nursing home, costs per diem rose $9.07 from 1989 to 1991, while the per diem reimbursement rate grew by $9.50. The significant increase in RN staffing intensity is consistent with regulatory policy requiring increased RN coverage for all facilities in the state.

While the decrease in patient discharges may reflect resident populations with greater long-term chronic care needs, an unexpected decrease in the case-mix values suggests that the average facility was unresponsive to reimbursement policies favoring heavy-care Medicaid patients. Differences in the assessment process may have influenced these results. In addition, the case-mix values may not be as precise as would be desirable due to the trade-off between simplicity and sophistication inherent in Kentucky's decision to adopt its relatively straightforward eight-factor, four-point evaluation system. Although the evidence suggests that at least some homes changed strategies in response to the new reimbursement regime, two years may be too short a time in which to expect the entire industry to revamp its strategies and to implement the new strategies, especially given the often long-term nature of their patient base. While change may not be complete, we have seen no evidence suggesting that nursing homes have not responded and are not continuing to respond to the economic incentives introduced by the state.

Cross-Sectional Regressions

The R^2s for the cross-sectional regressions (Table 2) indicate that the model predictors account for a significant proportion of the variation in facility expenditures, efficiency, and margin for both study years.

Market Effects. With one exception, differences in market excess capacity had no effect on nursing home performance variables. The 1989 data

Table 1: Descriptive Statistics (Means and Standard Deviations)

Variable	*1989 (s.d.)*	*1991 (s.d.)*	*t*
Excess capacity (county)	.8233	.6736	−2.059**
	(1.114)	(.9881)	
Home health patients (county)	827	2006	6.40****
	(1033)	(3385)	
Case mix	2.78	2.61	−7.60****
	(.363)	(.316)	
Discharges	66.78	53.72	−4.37****
	(67.72)	(54.42)	
RN staffing intensity	0.03	0.05	3.67****
	(0.03)	(0.07)	
Code deficiencies	3.81	5.68	2.70***
	(6.76)	(7.89)	
Poor quality	0.18	0.12	−0.31
	(3.32)	(3.12)	
Cost per diem	45.28	54.35	22.59****
	(10.75)	(11.51)	
Reimbursement rate	44.71	54.21	21.12****
	(5.15)	(7.74)	
Excess capacity (home)	4.47	2.37	−6.76****
	(5.54)	(3.35)	
Proportion of Medicaid residents	0.74	0.76	3.41****
	(0.20)	(0.19)	
Beds	92.27	97.99	2.53***
	(42.94)	(42.79)	
For-profit status	0.78	0.78	−1.00
	(0.41)	(0.42)	
Chain-operated	0.48	0.51	1.41
	(0.50)	(0.50)	

*$p < .10$; **$p < .05$; ***$p < .01$; ****$p < .001$.

indicate that facilities located in counties with a greater than average number of empty beds spent more per case-mix unit. By comparison, the availability of home health services was a significant predictor of facility costs, efficiency, and margin during 1989. Nursing homes from counties with greater home health service coverage exhibited higher costs, lower efficiency, and less profitability. Although nursing homes encountering greater competition from home health services spent more per case-mix unit in 1991, the effect of service coverage on per diem costs and profitability was not significant.

In sum, these data fail to reveal any effects of excess demand on nursing home cost, efficiency, and margin before or after the introduction of case mix—adjusted reimbursement. Although competition from home health services had significant effects on these performance variables, the

Table 2: Cross-Sectional Regression Results

	Costs		*Efficiency*		*Margin*	
Variable	*1989 (Std. Error)*	*1991 (Std. Error)*	*1989 (Std. Error)*	*1991 (Std. Error)*	*1989 (Std. Error)*	*1991 (Std. Error)*
Excess capacity (county)	.556	−.185	.415*	−.0086	−.587	.211
	(.587)	(.528)	(.231)	(.333)	(.591)	(.528)
Home health patients (county)	.002***	.00016	.00085***	.0024**	−.0018***	−.00018
	(.001)	(.000)	(.000)	(.000)	(.001)	(.000)
Case mix	4.012**	−6.067***	—	—	−2.886*	5.167***
	(1.829)	(1.917)			(1.728)	(1.708)
Discharges	−.003	.013	−.005	−.0088	.0072	−.014
	(.014)	(.014)	(.005)	(.008)	(.014)	(.014)
RN staffing intensity	6.71	−.944	−.708	1.731	−3.331	.496
	(18.378)	(6.741)	(7.297)	(4.208)	(18.408)	(6.728)
Code deficiencies	−.138	.00054	−.051	.019	.127	.0034
	(.089)	(.066)	(.035)	(.042)	(.089)	(.066)
Poor quality	−.310	−.209	−.243**	−.447	.338	.193
	(.295)	(.298)	(.115)	(.186)	(.297)	(.298)
Reimbursement rate	.744***	1.095***	.127**	.189***	—	—
	(.144)	(.092)	(.054)	(.052)		
Excess capacity (home)	.387***	.269	.176***	.220*	−.350***	−.316
	(.122)	(.209)	(.048)	(.132)	(.121)	(.204)
Proportion Medicaid residents	−9.474**	−7.460*	−2.549*	−1.285	7.536**	8.478***
	(3.443)	(3.187)	(1.368)	(2.010)	(3.289)	(3.031)
Beds	−103**	−.097***	−.039**	.0091	.094**	.100***
	(.045)	(.038)	(.018)	(.013)	(.045)	(.038)

continued

Table 2: (continued)

	Costs		*Efficiency*		*Margin*	
Variable	*1989 (Std. Error)*	*1991 (Std. Error)*	*1989 (Std. Error)*	*1991 (Std. Error)*	*1989 (Std. Error)*	*1991 (Std. Error)*
Beds-squared	.00029**	.00021*	.00014**	–	−.00027*	−.00022*
	(.000)	(.000)	(.000)		(.000)	(.000)
For-profit	−7.851***	−3.204**	−3.157***	−3.604***	7.359**	3.732**
	(1.524)	(1.343)	(.599)	(.825)	(1.51)	(1.242)
Chain-operated	1.167	1.853*	.510	.923	−.796	−1.904*
	(1.207)	(1.037)	(.480)	(.651)	(1.198)	(1.036)
R^2	.61	.75	.50	.45	.40	.32
F-value	16.61***	31.93***	11.82***	10.26***	7.57***	5.36***

*$p < .10$; **$p < .05$; ***$p < .01$.

effects occurred primarily in the period prior to the implementation of case mix—adjusted reimbursement.

Facility-Level Effects. Notable differences between the 1989 and 1991 equations emerged for the case-mix variable. In 1989, prior to the actual implementation of case mix—adjusted reimbursement, a heavy-care resident population was positively related to facility expenditures. The coefficient indicated that for each unit increase in case mix, a home spent an additional $4.00 per diem. In contrast, once the case-mix reimbursement program was in place, the extent of patient debilitation was inversely related to costs. In this instance, facilities experienced a $6.00 decrease in per diem costs with each additional case-mix unit. The data for margin revealed comparable results. Higher patient acuity was negatively related to profitability prior to case-mix reimbursement and positively related after the reimbursement policy took effect.

Although nursing home performance variables were unrelated to Medicaid code deficiencies, poor-quality nursing practices were negatively associated with cost per case-mix unit in both 1989 and 1991, suggesting that greater reliance on poor-quality nursing practices increased the homes' capacity to manage heavy-care patients more cheaply. The coefficient for this variable was nearly twice as large in 1991, when the reimbursement surplus encouraging inexpensive management of heavy-care patients was available. The size of the Medicaid reimbursement rate coefficient also changed across the two study periods. Prior to case mix—adjusted payments, an additional dollar of reimbursement resulted in an additional $0.74 spent on patient care or an additional $0.13 per case-mix unit. By comparison, in 1991 an additional dollar of reimbursement yielded an additional $1.10 in patient care expenditures or an additional $0.19 per case-mix unit.

Although facility excess capacity was related to costs, efficiency, and margin in 1989, the variable was not significant in 1991. The loss of significance may reflect the overall decrease in excess capacity at both the market and facility level from 1989 to 1991. Indeed, 50 percent of the sample was at or near capacity (i.e., had less than one empty bed) in 1991, while only 28 percent of the sample experienced capacity occupancy rates in 1989.

By and large, the number of beds and beds-squared variables conform to the conventional U-shaped average cost curve. Economy of scale advantages are manifested in facility per diem costs and profitability. In particular, analysis of the size-margin relationship reveals that margin increases up to 174 and 227 beds for 1989 and 1991, respectively. Thus, increasingly larger facilities (which accounted for less than 5 percent of the total sample) experienced slight diseconomies of scale.

Consistent with previous nursing home cost studies, the percentage of Medicaid residents is inversely related to facility expenditures. The coefficients indicate that as the percentage of Medicaid residents increases from zero to 100 percent, cost per diem declines. Cost per diem declined $9.50 and $7.50 in 1989 and 1991, respectively. Analogously, model estimates for nursing home margin reveal an increase in profitability between $7.50 and $8.50 with equivalent increases in the proportion of Medicaid residents. The equations also show that proprietary homes have lower costs (approximately $3.00 to $8.00), higher efficiency (about $3.00 less per case-mix unit), and higher margins (approximately $4.00 to $7.00) than nonprofit homes.

First-Difference Regression

Table 3 presents results from three first-difference regression equations in which changes in facility expenditures, efficiency, and margin served as dependent variables. As indicated by the F-tests, all three regression models were statistically significant ($p < .01$).

Market Effects. Consistent with the cross-sectional regression estimates, changes in market-level excess capacity had no influence on nursing home performance over time. In contrast, nursing homes located in markets with increases in home health services exhibited higher growth in costs per case-mix unit. At the same time, these facilities also experienced greater increases in profitability between 1989 and 1991.

Facility-Level Effects. A perusal of facility characteristics reveals that changes in facility excess capacity and the proportion of Medicaid residents were related to variation in nursing home performance over time. Specifically, for each empty bed filled by the facility, any rise in per diem cost is reduced by $0.39 while margin increases by $0.38. Similarly, increasing the proportion of Medicaid residents from .74 to .84 reduces growth in costs per case-mix unit by $0.55 and increases margin by $1.45. Of the remaining variables in the model, only the poor-quality measure is a significant predictor of expenditure increases. In this case, there is an inverse relationship, which means that nursing homes with an increasing prevalence of poor nursing care practices experienced smaller increases in expenditures and costs per case-mix unit while earning higher increases in margin.

DISCUSSION

From the facility's perspective, eliminating excess capacity and increasing the proportion of Medicaid residents are the most effective responses to the

Table 3: First-Difference Regression Results

Variable	*Change in Cost Per Diem (Std. Error)*	*Change in Efficiency (Std. Error)*	*Change in Margin (Std. Error)*
Excess capacity (county)	0.412	.319	.257
	(.428)	(.246)	(.581)
Home health patients	.0002	.00021**	.00051**
(county)	(.000)	(.000)	(.000)
Case mix	1.960		1.938
	(1.374)	–	(1.824)
Discharges	.0034	.0028	.0058
	(.011)	(.006)	(.014)
RN staffing intensity	3.793	.845	−.817
	(4.821)	2.785	(6.592)
Code deficiencies	0.033	.0084	−.034
	(0.044)	(0.025)	(0.060)
Poor quality	−.282*	−.217**	0.553**
	(.173)	(0.100)	(0.235)
Reimbursement rate	.143**	−.0095	
	(.074)	(.041)	–
Excess capacity (home)	.394***	.132**	−.376***
	(.098)	(0.057)	(0.134)
Proportion medicaid	−7.226	−5.485**	10.445*
residents	(4.623)	(2.672)	(6.319)
Beds	−.126	−.068	.056
	(.110)	(.064)	(.150)
For-profit	−3.181	2.434	4.169
	(4.969)	(2.863)	(6.804)
Chain-operated	0.304	.005	−1.623
	(1.792)	(1.035)	(2.449)
R^2	.20	.14	.16
F-value	2.87***	2.07**	2.47***

*$p < .10$; **$p < .05$; ***$p < .01$.

beginning phase of case-mix reimbursement. The average nursing home pursued both courses with no attendant rise in case mix. Indeed, case-mix levels for the average nursing home dropped between 1989 and 1991, although the decrease could have turned on differences in the assessment process. By itself, the strategy of initiating changes in case mix had no reliable influence on profitability or costs. Hence, as a strategic response to the new reimbursement policy, increasing heavy-care access was not uniformly effective. At the same time, the growing availability of home healthcare made it difficult for homes to increase profits by exclusively seeking lower-cost light-care patients. Thus, the effect of home healthcare on the nursing home market

was an important reason for the increasing costs per case-mix unit observed during the study period.

Changes in the reimbursement policy probably motivated reductions in facility excess capacity and effectively decreased the number of empty beds. First, on a positive note, facilities may have simply reduced the time they kept empty beds open because they had less motivation to wait for light-care patients, and the wait was likely to be longer in areas with home healthcare services. Second, holding case mix constant, achieving occupancy rates at or near unity enhances the measure of efficiency (i.e., cost per case-mix unit) on which reimbursement incentives are based. Given this reimbursement incentive for efficiently managing expenditures, one may speculate that increasing numbers of facilities will prefer achieving full capacity—with or without the addition of heavy-care patients—to extended periods of excess capacity.

Although a reimbursement preference for full capacity may be an effective deterrent to excluding heavy-care patients, the average facility did not adopt an explicit policy favoring heavy-care admissions. Despite lower costs and higher margins among high case-mix homes in 1991, positive changes in margin accompanied increases in Medicaid access, not in heavy-care access. The short-term benefits of increasing heavy-care access may have been difficult for all homes to realize. Moreover, facilities opting for higher proportions of heavy-care residents are likely to manage costs and the reimbursement system in different ways. For instance, reimbursement rates and actual costs may not yield consistent profitability across all heavy-care patient types, as Nyman and Connor (1994) observed with Minnesota's case-mix program. Given pervasive excess demand, nursing homes that recognized such discrepancies could have engaged in selective admissions based on the profitability of particular heavy-care types. Unfortunately, the nature of the Kentucky system precludes our assessing this possibility. Alternatively, facilities may counter any cost increases with cost-saving practices, some of which may be detrimental to quality. At least for the initial phase of case mix—adjusted reimbursement, our results show that those facilities that increased their use of the poor nursing practices often associated with heavy-care residents contained increases in expenditures while boosting gains in margin. Also, both cross-sectional and first-difference regression coefficients indicate that these practices were strongly related to the measure of efficiency used by the state to allocate any reimbursement surplus. Subsequent data are needed to assess whether cost and/or reimbursement rate advantages associated with these less desirable practices accrue over the long term.

Finally, home health service growth contributed to the higher increases in cost per case-mix unit observed in this sample of facilities. Although the reason for this increase is unclear, the rise could be attributable to quality enhancement efforts, assuming that cost and quality are positively correlated, as facilities respond to increased competitive pressure stemming from a diminished demand for institutional care. Given the overall decrease in excess market bed supplies within the state, the growth in home health services may provide some much-needed relief from the underbedded conditions that foster an emphasis on reducing expenditures and exert negative influences on nursing home quality. Likewise, nursing homes facing the loss of light-care patients to home health services may be actively pursuing heavy-care residents who simply require more resources. Either interpretation invites a positive view of the effect of home health services.

Implications for Policy and Research. Although our analysis of case mix–adjusted reimbursement centered on profit-maximization measures of performance, the findings do have policy implications for quality of care and patient access. In Kentucky, the reimbursement reward for heavy-care admissions is supposed to be contingent on improved efficiency. Whether pushed by competition or pulled by reimbursement incentives, only facilities capable of managing heavier-care patients efficiently reap the reimbursement bonus provided by the state. Currently, rewards go to those who spend less, not more. This emphasis raises immediate concerns over diminished quality of care and rehabilitative efforts, especially given Kentucky's definition of "efficiency," which does not attempt to hold quality constant or even to establish a link between the level of cost and the level of quality. In particular, Thorpe, Gertler, and Goldman (1991) question the desirability of pricing strategies in reimbursement programs. Pricing systems like the one employed by Kentucky discount any possibility of a link between cost and quality among high-cost nursing homes. These facilities are simply labeled inefficient and penalized accordingly. In contrast, reimbursement rewards for true economic efficiency presumably "allow low-cost homes to provide higher quality of care" (p. 360). The issue is whether reduced payment punishes inefficiency without diminishing quality and whether a bonus payment simultaneously encourages higher quality and efficiency. Thorpe, Gertler, and Goldman (1991), for example, reported higher cost growth among overpaid (i.e., efficient) facilities, but whether or not the cost increments improved the functional health status of nursing home residents is not clear. Consequently, case-mix systems that incorporate pricing components should be evaluated for intended as well as unintended effects.

To facilitate heavy-care access, reimbursement systems must be profit neutral. Case mix—adjusted rates that do not match the actual costs of care for various heavy-care patient types create overcompensation as well as undercompensation. Empirical evidence suggests that nursing homes respond to such profitability differences with selective admissions (Nyman and Connor 1994). Under the circumstances, selective admission becomes somewhat more sophisticated, because some heavy-care types identified as profitable can moderate the preference for light-care residents. Although the present data preclude any analysis of selective admission practices, the Commonwealth of Kentucky instituted a formal study of Medicaid reimbursement in 1996 to determine the extent to which facilities manipulate the CMAR system. Given the complexity of estimating costs of care for different patient types, system discrepancies are inevitable. It follows that monitoring admission patterns and identifying profitable (and unprofitable) patient types are possible ways of evaluating whether access-neutral reimbursement has been realized and of determining necessary system adjustments. Unfortunately, not all system discrepancies are easy to detect. For instance, "managing" patient care documentation and fraudulent record keeping produce "bracket creep" as well as the means to maintain disproportionate reimbursement rates. Weissert and Musliner (1992) suggest that random audits, which are currently employed by states to check the authenticity of cost reports, might deter such practices. Systems with the relevant data might also group case-mix estimates for new admissions separately from those for current residents. In this way, researchers could evaluate the extent to which admission practices, rather than the upcoding of current residents, account for changes in the facility's case-mix index.

Encouraging continued growth in home health services is both a market- and policy-oriented strategy for dealing with heavy-care and quality-of-care issues. As a market mechanism, increasing home health service availability should help alleviate excess demand constraints on quality, restrain unbridled cost minimization, and encourage heavy-care nursing home admissions. Further, the Medicaid reimbursement policy for home health services must be factored into the equation if that market is to attract adequate numbers of new service providers. Of course, the aggregate system costs must be evaluated to determine the most effective blend of institutional and community-based care alternatives. In our view, an effective synthesis of market forces and policy initiatives will effect workable and affordable approaches to achieving heavy-care access, quality of care, and system efficiency.

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