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Paul J. Gertler

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ABSTRACT

In this paper I show that the Medicaid program can improve the access of financially indigent patients to nursing home care by raising the rate of return paid on Medicaid patients' care, but only at the cost of of lower quality of care. To quantify the policy tradeoff, I derive expressions for the elasticity of access with respect to total Medicaid expenditures and the elasticity of access with respect to quality. These elasticities expressions are complicated by the fact that Medicaid payment formulas are cost based and, therefore, depend on the quality choices of nursing homes. Using New York State data, I find that a 10% increase in Medicaid expenditures induces a 4.1% increase in Medicaid patient care but also reduces nursing home expenditures on patient services by about 3.4%.

Paul J. Gertler
Dept. of Health Policy & Management
Harvard School of Public Health
677 Huntington Avenue
Boston, MA 02115

I. INTRODUCTION

The Medicaid program faces at least two well documented problems in the long-term care industry: many financially indigent patients cannot gain access to nursing homes and rapidly rising expenditures.[1] One solution to the access problem may be for the Medicaid program to induce nursing homes to admit more Medicaid patients by paying a higher rate of return on Medicaid patient care. Gertler and Andreano (1982), Nyman (1985) and Gertler (1989) demonstrate that increases in the rate of return on Medicaid patient care indeed induces nursing homes to admit more Medicaid patients, but it also causes them to lower quality.[2] Thus, the Medicaid program can expand Medicaid patient access to care, but only at lower levels of quality. If the lower levels of quality are acceptable, this may be an option worth considering since more Medicaid patients would at least obtain access to some care.

One potentially positive implication of the reduction in quality is that it lowers the cost of inducing nursing homes to admit more Medicaid patients. Since most Medicaid payment mechanisms are cost based, reductions in quality also decrease the cost portion of the Medicaid reimbursement rate. In an era when governments are facing severe budget crunches and Medicaid expenditures on nursing home care are currently on the order of $18 billion and rising rapidly, the price tag associated with lower quality care may be attractive.

In this paper, I empirically investigate the cost of expanding Medicaid patient access by raising the return on Medicaid patient care in terms of increased Medicaid expenditures and reduced quality. The calculation of the access-expenditure-quality tradeoff, though, is complicated because of all three of the variables of interest are endogenous. I derive and estimate three elasticities which fully characterize the tradeoff.

This analysis of additional interest in the light of other motivations for increasing the return on Medicaid patient care. Davies and Covaleski (1981) argue that nursing homes are underinvesting in capital maintenance due to inadequate depreciation allowances in the Medicaid reimbursement formulas. Also, there is debate as to whether not-for-profits should be paid the same return on equity as proprietary institutions (Long and Silvers, 1976; Conrad, 1984; Pauly, 1986).

In section II, a model of nursing home behavior developed in Gertler and Andreano (1982) is used to provide intuition as to why an increase in the rate of return on Medicaid patients is incentive for nursing homes to reduce quality and increase access. In the development of the model, notation and institutional detail necessary for the derivation of the elasticities and for the empirical specification is also supplied. Afterwards, the elasticity formulas and their calculation are discussed. The rest of the paper is devoted to the empirical work which uses New York State data.

II. A THEORY OF NURSING HOME BEHAVIOR

II.a. Institutional Structure and Assumptions

The business of nursing homes is to provide their patients with a package of commodities such as medical care, room and board, and social activities. Some of these services are are devoted to rehabilitation and others towards life-style maintenance. Let us define the quality of a nursing home as an index of the goods and services it supplies a patient. This index certainly captures the maintenance aspect of nursing home care, and one would hope that the level of services provided is positively correlated with health outcomes.[3]

Nursing homes care for two types of patients: those who finance their care privately and those whose care is paid for through the Medicaid program. The sum of private-pay and Medicaid patients cannot exceed a level determined by regulation. A nursing home's capacity is regulated by the Certificate of Need (CON) cost containment program.[4] CON attempts to control total industry expenditures by limiting the supply of nursing home beds. CON requires that, in order to expand an existing nursing home or build a new one, the government must certify that the proposed facility is indeed "needed." CON effectively limits the capacity of existing nursing homes and new entry into the market.

Nursing homes are assumed to provide private-pay and Medicaid patients with the same level of quality. This follows from the legal restriction that homes cannot discriminate in the provision of services based on source of payment, and that most nursing home services such as nursing care, social services, dietary services are jointly produced for both types of patients and exhibit economies of joint production. It is technically and legally difficult to improve the level of services provided private-pay patients without also improving them for Medicaid patients.

Homes can charge private-pay patients what the market will bear, and private-pay demand is a function of price and quality. Let a home's private-pay patient demand function be given by $X(P,Q)$, where X is the number of private-pay patients, P is the private-pay price, and Q is the quality provided each patient. Private-pay demand is assumed to be decreasing in price ($X_P < 0$) and increasing in quality ($X_Q > 0$).

In contrast, homes receive the Medicaid reimbursement rate for the care of Medicaid patients. Medicaid demand depends only on quality since Medicaid

patients pay zero out of pocket. Because the price of nursing home care is zero, Medicaid patients prefer nursing home care at some low quality level over independent living. If there are more eligible Medicaid patients than (CON allowed) capacity, homes can fill all of their beds with Medicaid patients at some minimum quality level and receive the Medicaid reimbursement rate for each patient. Above this minimum quality level Medicaid demand is perfectly elastic at the Medicaid reimbursement rate, implying that it is insensitive to price and quality increases.

Several institutional factors support the supposition that Medicaid demand is perfectly elastic. First, almost all homes have a mix of private-pay and Medicaid patients. Since private-pay patients pay a positive price and nursing homes must supply the same level of quality to both types of patients, quality must be above the minimum level at which Medicaid patients (who pay zero) prefer nursing home care over independent living. Second, in my New York State sample, all homes operate at well over 95% capacity.[5] Third, there are long lists of Medicaid patients waiting in hospitals waiting for nursing home openings. Finally, Scanlon (1980) econometrically tests and cannot reject the hypothesis of excess Medicaid demand for nursing home care. Under excess Medicaid demand, the CON capacity constraint is binding. Formally, the CON capacity constraint is:

$$X + M = \bar{X} \tag{1}$$

where X is the number of private-pay patients, M is the number of Medicaid patients, and $\bar{X}$ is the CON allowed capacity.[6]

A nursing home's costs are assumed to be a function of the total quantity of its patients and the total quality supplied. The total quantity of patients is the sum of Medicaid and private-pay patients, which is fixed at $\bar{X}$ by the CON capacity constraint. Since nursing homes are assumed to supply the same level of quality to both types of patients, a home that provides quality Q to $\bar{X}$ patients supplies a total quality of $\theta = Q\bar{X}$. The cost of providing quality Q to $\bar{X}$ patients, then, is $C(\bar{X},\theta)$. The cost function is assumed to be increasing in quantity and quality, and convex in quality.

Medicaid is jointly financed by the federal and state governments, with the state administrating the program. Most state Medicaid programs use a cost-plus method to reimburse homes for the care of Medicaid patients (Harrington and Swan, 1984). Under this method, a home is paid its average variable costs plus some return.[7] Thus, the payment per Medicaid patient is:

$$R = r + C(\bar{X},\theta)/\bar{X} \qquad (2)$$

where R is the Medicaid reimbursement rate and r is the plus factor.

In summary, government regulation allows nursing homes into price discriminate, but not to quality discriminate. The Medicaid program creates a second market for nursing home care, and CON restricts supply so that there is excess Medicaid demand. Homes charge private-pay patients what the market will bear and receive the Medicaid reimbursement rate for the care of Medicaid patients. They use price and quality to compete for private-pay patients knowing that they can always fill excess capacity with Medicaid patients at the Medicaid reimbursement rate.

II.b. Equilibrium

Homes choose P and Q so as to maximize profits subject to the CON capacity constraint in (1).[8] The profit function is:

$$\Pi = PX(P,Q) + R[\bar{X} - X(P,Q)] - C(\bar{X},\theta). \tag{3}$$

The first-order conditions $\Pi_P=0$ and $\Pi_Q=0$ imply:

$$(P - C/\bar{X})X_P + X = rX_P \tag{4}$$

$$(P - C/\bar{X})X_Q - C_\theta X = rX_Q \tag{5}$$

Private-pay price is chosen in (4) so that marginal private-pay profits equal the opportunity cost of foregone Medicaid profits, and quality is chosen in (5) so that marginal private-pay profits equal the opportunity cost of foregone Medicaid profits.[9]

II.c Medicaid Reimbursement Incentives

With cost-plus reimbursement, the government's policy instrument is the plus factor. An increase in r raises marginal Medicaid revenue, making Medicaid patients more profitable relative to private-pay patients. The higher marginal Medicaid profit is an incentive to increase the number of Medicaid patients. Since the CON capacity constraint is binding, the only way a home can increase Medicaid patients is to reduce private-pay patients. Homes reduce private-pay demand by lowering quality and/or by increasing price.

III. MEDICAID EXPENDITURE ELASTICITIES

Informed policy decisions require knowing not only how much to raise r in order to expand Medicaid patient access a given amount, but also what will be the resulting change in total Medicaid expenditures and fall in quality. The first portion of this information is captured by observing how nursing homes adjust their patient mix in response to a change in r. The later information is summarized in by the elasticity of access with respect to total Medicaid expenditures and in the elasticity of access with respect to quality. These two elasticities fully characterize the welfare tradeoffs.

Measuring these elasticities, though, is complicated because access, Medicaid expenditures and quality are all endogenous. Their calculation requires knowing how much access, quality and total Medicaid expenditures change for a given adjustment in the policy mechanism r. The access-expenditure elasticity, therefore, is the ratio of the elasticity of access with respect to r to the elasticity of total Medicaid expenditures with respect to r. Specifically, the access-expenditure elasticity is:

$$\eta_{ME} = \eta_{Mr}/\eta_{Er}. \tag{6}$$

Where η_{Mr} is the access-return elasticity and η_{Er} is the expenditure-return elasticity. Similarly, the access-quality elasticity is:

$$\eta_{MQ} = \eta_{Mr}/\eta_{Qr}. \tag{7}$$

Where η_{Qr} is the quality-return elasticity. The η_{MQ} measure the marginal rate of substitution of access for quality in elasticity form.

The computation of the elasticities in (6) and (7) requires knowing how nursing homes' patient-mix and quality choices response to changes r. The η_{Mr} and η_{Qr} terms are obtained directly from these behavioral responses. One complication, though, is the measurement of the quality response. A convenient proxy for the change in quality due to an increase in r is the corresponding change in nursing home expenditures on patient care. Assuming that nursing homes are cost minimizers — not a bad assumption given that over two-thirds of all homes categorize themselves as proprietary — nursing home costs are monotonically increasing in quality. Moreover, if nursing homes exhibit constant returns to scale in quality, then the relationship between costs and quality is linear. Therefore, a reduction in quality should be accompanied with a reduction in costs.

The remaining term, η_{Er}, is a combination of three effects: a price effect, a quality effect and a quantity effect. Total Medicaid expenditures are E = RM — i.e. the reimbursement rate times the number of Medicaid patients. An increase in r induces nursing homes to increase M and reduce Q. Total Medicaid expenditures are increased from both from the rise in M and the change in R. The increase in r raises R directly through the plus factor and indirectly reduces R through the fall in Q. The fall in Q reduces average cost which lowers the cost portion of the cost-plus Medicaid reimbursement rate. The net change in E is the sum of these effects.

Formally, differentiation of E with respect to r yields:

$$\partial E/\partial r = M + (\partial C/\partial Q)(\partial Q/\partial r)(M/\bar{X}) + R(\partial M/\partial r) \qquad (8)$$

Thus, the change in Medicaid expenditure is decomposed into three effects. The first term on the right-hand side of (8) is the price effect, which is the direct effect of a change in r an R. That magnitude is one times the number of Medicaid patients. The second term is the quality effect, which is the indirect change in R via average cost. The increase in r causes a reduction in quality and, consequently, a reduction in average cost. The magnitude of the effect is the change in average cost times the number of Medicaid patients. Finally, the quantity effect is the change in the number of Medicaid patients times the Medicaid reimbursement rate.

Equation (8) expressed in elasticity form is:

$$\eta_{Er} = \eta_{Rr} + \eta_{Cr}(AC/R) + \eta_{Mr}, \qquad (9)$$

where $\eta_{Rr} = r/R$, η_{Cr} is the elasticity of nursing home expenditures on patient care with respect to r and AC is average cost $(C/\bar{X})$. The difficulty in calculating the decomposition of the Medicaid expenditure elasticity in (10) is the estimation of η_{Cr} and η_{Mr}. The other terms can be computed directly. As discussed above, the η_{Cr} and η_{Mr} terms are obtained will be obtained from estimating nursing home cost functions and patient-mix choice models which is the subject of the next section.

IV. EMPIRICAL SPECIFICATION

The hypotheses focus on the effect of r on nursing homes' choices of M and Q. Since these concern comparative statics effects, they can be obtained from a reduced-form. I begin with a logarithmic approximation to the solution of the first order conditions for quality and the number of Medicaid patients:[10]

$$m_i = \beta_{10} + \beta_{11}\bar{x}_i + \sum_{j=1}^{J}\beta_{1,j+1}z_{ij} + \sum_{k=1}^{K}\beta_{1,J+1+k}w_{ik} + \epsilon_{1i} \qquad (10)$$

$$q_i = \beta_{20} + \beta_{21}\bar{x}_i + \sum_{j=1}^{J}\beta_{2,j+1}z_{ij} + \sum_{k=1}^{K}\beta_{2,J+1+k}w_{ik} + \epsilon_{2i}, \qquad (11)$$

where the z's are exogenous demand variables and r, the w's are exogenous supply variables and the ϵ's are random disturbances. The lower case notation indicates that all variables are measured in natural logs. This functional form was chosen because of the ease with which elasticities are obtained.

Whereas equation (10) provides an estimate of η_{Mr} (i.e. the coefficient on r), the calculation of η_{Cr} requires some more work. A simple approach is to substitute the quality equation (10) into a cost function. Assuming a Cobb-Douglas functional form, the cost function is:[11]

$$c_i = \alpha_0 + \alpha_1 q_i + \alpha_2\bar{x}_i + \sum_{k=1}^{K}\alpha_{k+2}w_{ik} + \tau_i, \qquad (12)$$

where the lower case notation again indicates that the variables in natural logs. Substitution of the quality equation (12) into (13) yields the reduced-form cost function:

$$c_i = \gamma_0 + \gamma_1\bar{x}_i + \sum_{j=1}^{J}\gamma_{1,j+1}z_{ij} + \sum_{k=1}^{K}\gamma_{1,J+1+k}w_{ik} + \nu_i. \qquad (13)$$

The coefficient on r in (14) is an estimate of η_{Cr}.

IV. DATA

The data are constructed from New York State's 1980 survey of Long Term Care Facilities. The sample consists of 446 nursing homes chosen from 798 possible cases. Excluded were government homes, hospital attached homes, and non-reporting homes. Also, Cook's distance statistic indicated that 13 observations seemed to have undue influence on the parameter estimates. Upon closer inspection, 9 of these observations appeared to have extreme values for some of the variables and were dropped from the estimation. The variables are daily averages, with the unit of observation being the nursing home. Descriptive statistics are presented in Table 1.

The dependent variables are the number of Medicaid patients and total cost. The exogenous supply variables are input prices and capital stock. The input prices are the hourly nursing wage rate and the hourly wage rate of other labor. Since the majority of capital owned by a nursing home is the facility itself, capital stock is measured as total area of the facility in square feet. The exogenous demand variables are the per capita income of the people living in the nursing home's market area, the population over age 65 in the nursing home's market area, and the proportion of "private pay" patients in the nursing home whose last residence before entering the nursing home was located in the same county as the nursing home, an index of health status of patients in the nursing home (casemix), and an index of market concentration.

The proportion of private-pay patients from the same county measures the geographic density of the nursing home's market. The smaller the market, the closer the nursing home is located to the family and friends of its patients. Presumably, nursing homes that are located closer are more attractive.

Table 1
Means and Standard Deviations (N = 446)

Variable	Mean	Standard Deviation
1. Total Cost	5,818.10	5,827.51
2. Medicaid Patients	98.33	83.56
3. Total Patients	122.22	85.62
4. Beds	124.20	86.74
5. Case Mix	0.39	0.17
6. Nurse's Wage	7.80	2.76
7. Other Labor Wage	11.82	6.77
8. Capital	66,822.68	25,713.73
9. Medicaid Plus	6.33	3.01
10. Population 65+	106,180.19	87,516.87
11. Median Income	7,137.61	
12. Market Concentration	0.12	0.11
13. % Patients From Same County	0.75	0.25
14. Proprietary Home	0.63	0.48

Defining a home's market requires some work. Since homes do not compete for Medicaid patients, the appropriate market to analyze is the private-pay patient market. The common assumption is that a home's geographic market is the county in which the home is located but patient origin data indicates that most homes care for a substantial number of patients whose last residence was not the county in the home is located. Instead, separate market areas are defined for each home based on patient origin data. Homes are assumed to par-

ticipate in several county markets. A home's participation in a county market is given by the proportion of the home's "private pay" patients from that county. Thus, a home's market area is defined as the counties in which its "private pay" patients last resided, and the proportion of its "private pay" patients from each county.

This market definition guides the construction of the demand variables. Each home's market population is computed as a weighted sum of the number of persons over age 65 in each county, using the home's proportions of private-pay patients from the counties as weights. Similarly, the per capita income of the population in a home's market area is computed as the weighted sum of the counties' per capita incomes.[12,13]

concentration index is a measure which is negatively related to the competitiveness of the market. The concentration level of a home's private-pay patient market is computed as a weighted sum of the county market concentration levels. The notion is that counties comprise separate markets and nursing homes compete for private-pay patients in several counties. The competitiveness of a home's market is a weighted average of the competitiveness of the county markets. The decomposition into county markets is artificial, but is necessary since the data come aggregated at the county level. The concentration of each county private-pay patient market is computed using Herfindahl-Hirschmann index (HHI).[14] The concentration of a home's market, then, is the weighted average of county HHI's.

The casemix (health) index is based on the Katz Activities of Daily Living (ADL) index. The ADL index is a measure of a patient's functional level. Katz (1963) developed the index to explicitly measure function levels among

the chronically ill and aging population, and it has proven a valid and reliable measure. The ADL index is computed from disability scores assigned patients in of each patient in eight functional areas. For each home, I sum patients' ADL scores and divide by the number of patients in the home. The result is an index of the average ill-health of the patients in a facility.

In 1980, New York reimbursed nursing homes using a cost "plus" method. New York computed a homes' "plus" factor based on owner's equity, debt structure, the size of the facility, and the value of assets. Care was taken to ensure that homes could not manipulate this formula by constantly reselling the home so as to increase the value of its assets. Also, the size of the home and assets were controlled by CON policy. Thus, some of the factors in the "plus" formula were exogenous to the home. Alternatively, homes could to some extent manipulate their equity and debt structure so as to maximize their "plus" factor net of taxes, but the equity and debt structure decisions are independent of variable input and patient-mix choices.

V. ESTIMATION RESULTS

The Medicaid-patients equation and cost function were estimated twice by least squares using different measures of the the total number of patients. The measures are the number of beds and the average daily census of patients. Given a binding CON capacity constraint, these should yield similar results. The estimation results are presented in Table 2. Columns 1 and 2 report the results for the cost function, and columns 3 and 4 report the results for the Medicaid patients equation. As can be seen from the coefficient estimates in Table 2, the results are almost identical for the two specifications. A sec-

ond specification issue concerns the pooling of proprietary and not-for-profit homes into a single model. Pooling proprietary and not-for-profit homes into a single equation with a dichotomous variable indicating ownership status could not be rejected in favor of separate models.[15]

The results are very reasonable. The models are estimated with great precision as most of the variables are significantly different from zero and the R^2's are very high. Moreover, the signs and magnitudes of the coefficients are consistent with prior expectations.

The coefficients on the Medicaid plus factor are of most interest. As expected, an increase in r raises the number of Medicaid patients and lowers costs. The reduction in costs is a result of a fall in quality.

The reduced-form cost function coefficients are combinations of structural cost function and reduced-form quality parameters and are therefore difficult to interpret. Nevertheless, there are a few interesting things to point out. The coefficient on total patients is not significantly different from one which is consistent with constant returns to scale. This is important since costs are a linear function of quality under constant returns to scale. Also, costs, not surprisingly, significantly increase with input prices and casemix. Increases in the demand for quality as indicated by population and income raise costs, and competition for private-pay patients raises costs. This suggests that quality is higher in more competitive markets. In addition, not for profit homes have about 11% higher costs. It is not clear, though, whether this is do to quality or lower efficiency.

Table 2
Estimated Coefficients and t-Statistics

Independent Variable	Total Cost		Medicaid Patients	
	1	2	3	4
1. Constant	2.59 (8.13)	2.69 (8.07)	1.13 (1.81)	1.14 (1.81)
2. Total Patients	0.97 (46.28)	-	1.14 (27.64)	-
3. Beds	-	0.97 (45.42)	-	1.14 (27.14)
4. Case Mix	0.28 23.64)	0.30 (24.02)	0.06 (2.66)	0.08 (3.07)
5. Nurse's Wage	0.33 (9.20)	0.34 (9.21)	0.48 (6.84)	0.50 (6.87)
6. Other Labor Wage	0.19 (7.65)	0.18 (7.26)	-0.03 (0.66)	-0.04 (0.80)
7. Capital	0.01 (0.33)	0.01 (0.31)	-0.05 (1.39)	-0.04 (1.31)
8. Medicaid Plus	-0.04 (3.18)	-0.04 (2.94)	0.05 (1.94)	0.06 (2.04)
9. Population 65+	0.05 (4.59)	0.05 (4.31)	-0.01 (0.36)	-0.00 (0.23)
10. Median Income	0.11 (2.74)	0.10 (2.59)	-0.23 (3.06)	-0.24 (3.09)
11. Market Concentration	-0.07 (4.99)	-0.07 (4.78)	0.08 (2.95)	0.08 (2.99)
12. % Patients From Same County	-0.03 (1.07)	-0.02 (0.83)	-0.16 (3.05)	-0.15 (2.88)
13. Profit	-0.11 (6.38)	-0.11 (6.31)	-0.10 (2.87)	-0.10 (2.83)
R^2	0.97	0.97	0.89	0.88

In the Medicaid patients model, the coefficient on total patients is one. This implies that as homes expand, they fill new capacity with Medicaid patients. This is consistent with predictions from the theoretical model. Homes choose the number of private-pay patients so as to equate the marginal profit from the two types of patients and fill additional capacity with Medicaid patients. Under constant returns to scale, then, additional capacity is filled entirely with Medicaid patients.

The number of Medicaid patients also rises with wage rates and casemix. Higher wage rates and casemix make it more expensive to produce quality. Thus, increases in wage rates and casemix are equivalent to increases in the marginal cost of quality leadin to lower levels of quality being chosen. Lower quality implies, through the private-pay demand function, lower private-pay demand. Lost private-pay patients are replaced with Medicaid patients.

Increases in demand for higher quality as indicated by income reduce the number of Medicaid patients. The reason for this is that a higher (private-pay) willingness to pay for quality induces nursing homes to supply higher quality. The higher quality increases private-pay demand which, via the CON capacity constraint, lowers the number of Medicaid patients.

Medicaid access is lower in more competitive markets patients. This is consistent with competition raising quality which increases private-pay demand and hence lowers the number of Medicaid patients. Finally, not-for-profit homes take about 10% more Medicaid patients than do proprietary homes.

VI. POLICY IMPLICATIONS

In this section I quantify the policy tradeoffs in terms of the elasticities developed in section II. The access-expenditure elasticity (η_{AE}) and the access-quality elasticity (η_{AQ}) fully describe the trade-offs between the variables of interest for welfare considerations, and the Medicaid expenditure elasticity with respect to r (η_{Er}) provides the information necessary to determine how much adjust r.

The estimated elasticities are presented in Table 3. They show that a 10% increase in Medicaid payments results in a 4.1% increase in Medicaid patients receiving care and a 3.4% fall in a nursing home's expenditure's on the services provided patients. In terms of action, the amount that the plus factor must be raised is determined by η_{Er}. Thus, in order to achieve a 10% increase in Medicaid expenditures, the plus factor must be increased by about 75%.

Table 3
Policy Elasticities

η_{ME}	η_{MQ}	η_{Er}
.406	-1.200	.133

An additional and somewhat surprising result concerns the extent to which the negative quality response reduces the expenditure-return elasticity. The decomposition of η_{Er} from (9) is presented in Table 4.[16] The expenditure-return elasticity is .131. Without the quality effect, η_{Er} would be .171 or about 30% higher.

Table 4
Medicaid Expenditure Elasticity Decomposition

η_{Er}	=	η_{Rr}	+	η_{Qr}*(AC/R)	+	η_{Mr}
.131	=	.117	-	.040	+	.054

V. SUMMARY

In this paper I show that Medicaid can improve the access of financially indigent patients to nursing home care by raising the rate of return paid on Medicaid patients' care, but only at the cost of of lower quality of care. To quantify the policy tradeoss, I derive expressions for the elasticity of access with respect to total Medicaid expenditures and the elasticity of access with respect to quality. These elasticities expressions are complicated by the fact that Medicaid payment formulas are cost based and, therefore, depend on the quality choices of nursing homes.

Using New York State data, I find that a 10% increase in Medicaid expenditures induces a 4.1% increase in Medicaid patients care but also reduces nursing home expenditures on patient services by about 3.4%. Two other noteworthy results obtained from the empirical work. The negative quality response reduces the expenditure-return elasticity by about 30%, quality is substantially higher in more competitive markets.

ENDNOTES

1 For example, see the Moreland Commission (1976), the General Accounting Office (1979), Bishop (1980), Vladeck (1980), the U.S. Senate Special Committee and Aging (1986), Holahan and Cohen (1987), Rivlin and Wiener (1988) for appraisals of the U.S. long term care industry.

2 Gertler and Andreano (1982) develop the arguments theoretically. Nyman (1985) independently develops the same theory and provides empirical support by showing that the Medicaid return is negatively correlated with the number of code violations in Wisconsin. In addition, Gertler (1989) shows that increases in the Medicaid return reduces the service intensity of nursing home care with New York State data.

3 This definition is commensurate with standard economic notions of quality. Lancaster (1976) and Leffler (1982) define quality in terms of the characteristics of a good other than the physical units in which it is priced. In the nursing home case, patient days are the physical units in which nursing home care is priced, and the quality characteristics of nursing home care are the goods and services supplied to each patient.

4 Waldman (1983) provides a description of the history of regulation in the nursing home industry.

5 Homes cannot operate at 100% capacity for several reasons: (1) they must hold open beds a certain numbers of days for patients who have temporarily entered hospitals for treatment of acute illnesses, (2) there are always a few days inbetween the discharge of a patient and the admission of a new patient so that homes with more turnover appear to have lower occupancy rates and (3) homes may hold open beds longer for preferred patients (e.g. a Jewish home may wait longer for a Jewish patient who must remain hospitalized a few days longer than take a non-Jewish patient).

6 Gertler (1989) shows that the CON capacity constraint implies testable parametric restrictions on an empirical model of patient mix and cannot reject those restrictions using the same New York State data used here. Since the CON capacity constraint is binding only if there is perfectly elastic Medicaid demand, this is also a test of the perfectly elastic Medicaid demand assumption.

7 Most of these states use a home's previous years average costs adjusted for inflation. This type of rolling base year is equivalent to cost-plus pricing, it just delays the receipt of revenues.

8 Implicitly, homes are assumed to be profit maximizers. The nursing home industry, though, has a mixed organizational structure. Approximately 65% of the home are proprietary, 35% are not-for-profit institutions primarily affiliated with religious organizations, and 5% are government facilities. Gertler and Andreano (1982) show that the same type of comparative static results demonstrated here can be obtained in a model where nursing homes are altruistic utility maximizers.

9 Of course, a couple of corner solutions are possible as well. If the Medicaid plus factor is low enough and private pay demand large enough, then homes will specialize in private-pay patients. On the other hand, if the Medicaid plus factor is very large, then homes will specialize in Medicaid patients. In this case, quality will be set at the minimum level. In the industry, though, almost all homes care for both types of patients suggesting that the interior solution is the appropriate case.

10 Since the CON capacity constraint is binding, an change in the number of Medicaid patients can only occur with the exact opposite change in the number of private-pay patients. Hence, it is enough to consider just the Medicaid patient equation.

11 The Cobb-Douglas functional form was chosen because elasticities are easily obtained. A more general method would be to use a flexible functional form such as the ever popular Translog. Since I am do not need structural parameters, but rather only require reduced-form parameters, it more convenient to use the first-order approximation. Since I am substituting the quality equation into the cost function, the parameter space is very large relative to the number of observations in my sample with the Translog. In any event, the first order approximations yields a consistent estimate of the elasticity of interest.

12 Some homes have patients from out of state. These patients are dropped from both the numerator and the denominator of the weights. This adjustment had to be made in only 17 cases. In each of those cases, out-of-state patients accounted for less than 10% of patients.

13 In order to determine the robustness of the market definitions several other weighting schemes were tried. They include: (1) using all patients instead of just private-pay patients to determine the weights, (2) using just the two counties that comprise the county of origin for the majority of a home's private-pay patients with corresponding weights and (3) using the two countries that comprise the majority of all of a home's patients with corresponding weights. The estimation results using these definitions did not vary in any significant way from the definition described in the text.

14 Scherer (1980) provides an excellent description of the properties of the HHI and other measures of market concentration.

15 Formally, this is equivalent to testing the null hypothesis that the slope coefficients are the same for both samples. The test statistic for the Medicaid patients equation was .71 and for the cost function is .56. They are both distributed F(11,42). The corresponding critical value at the .01 level is 2.18. Consequently, the null cannot be rejected.

16 The decomposition is computed at sample mean values of the variables.

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