NBER WORKING PAPER SERIES

SUBSIDIES, QUALITY, AND REGULATION IN THE NURSING HOME INDUSTRY

Paul J. Gertler

Working Paper No. 1691

NATIONAL BUREAU OF ECONOMIC RESEARCH
1050 Massachusetts Avenue
Cambridge, MA 02138
August 1985

I am indebted to Ralph Andreano, Thomas Coleman, Arthur Goldberger, Michael Grossman, George Jakubson, Salih Neftci, Robert Porter, Harvey Rosen, Warren Sanderson, Amy Taylor, Charles Wilson, and the participants of the NBER conference on Incentives in Government Financing for helpful suggestions. Of course, I am responsible for any remaining errors. The research reported here is part of the NBER's research program in Health Economics and project in Government Budget. Any opinions expressed are those of the author and not those of the National Bureau of Economic Research.

NBER Working Paper #1691
August 1985

Subsidies, Quality, and Regulation in the Nursing Home Industry

ABSTRACT

This paper analyzes the impact of the Medicaid patient subsidy and Certificate of Need (CON) cost containment programs on nursing home behavior. The analysis is complicated by the fact the both proprietary and "not for profit" nursing homes exist, and by the problem that quality is not directly observed.

Medicaid pays the for the care of the financially indigent by directly reimbursing nursing homes at a predetermined rate. As a result, nursing homes can price discriminate between patients who finance their care privately and patients whose care is financed by Medicaid. Nevertheless, nursing homes are required to provide the same quality to both types of patients. Typically, Medicaid reimbursement rates are set by a cost plus method, where the reimbursement per patient is equal to average cost plus some return referred to as the Medicaid "plus" factor. Our results show that Medicaid policy makers face a trade-off between quality and the access of poor to nursing home care. Specifically, we find that increases in the Medicaid "plus" factor cause nursing homes to reduce quality and substitute Medicaid patients for "private pay" patients. These quality differences can be quite large. In fact, in our sample, we find that homes who receive high Medicaid "plus" factors provide hundreds of thousands of dollars less in goods and services than homes who receive average Medicaid "plus" factors, certris paribus.

CON attempts to control nursing home expenditures by limiting the supply of beds with capacity constraints and entry barriers. Our analysis shows that CON policy makers are forced to trade off containing the size of the industry (and therefore total Medicaid payments) against quality and access of the poor to nursing home care. Specifically, we find that the capacity constraints and the reduced competition from the entry barriers lead to lower quality and fewer Medicaid patients receiving care.

Paul J. Gertler
Department of Economics
State University of New York
Stony Brook, NY 11794

I. INTRODUCTION

In the nursing home inoustry, government regulators are concerned with assuring a high standard of quality, providing the poor with access to care, and controling the expansion of the industry. To this end, the government has created the Medicaid (and Medicare) patient subsidy programs and the Certificate of Need (CON) cost containment program. This paper theoretically and empirically analyzes the impact of Medicaid and CON policy on nursing home behavior. The theoretical analysis is complicated by the fact that both proprietary and "not for profit" nursing homes exist, and the empirical work is complicated by the problem that quality is not directly observed.

Medicaid pays the for the care of the financially indigent by directly reimbursing nursing homes at a predetermined rate. As a result, nursing homes can price discriminate between patients who finance their care privately and patients whose care is financed by Medicaid. Nevertheless, nursing homes are required to provide the same quality to both types of patients, where quality is defined by the package of goods and services provided by the nursing home. Quality is determined by the "private pay" market. The greater "private pay" demand relative to Medicaid, the higher is quality. If the "private pay" market did not exist, then nursing homes would face only Medicaid demand, which is insensitive to quality, and therefore, would have no incentive to provide more quality than is necessary to obtain government certification.

Typically, Medicaid reimbursement rates are set by a cost plus method, where the reimbursement per patient is equal to average cost plus some return referred to as the Medicaid "plus" factor. Our results show that Medicaid policy makers face a quality-access trade-off. Specifically, we find that increases in the Medicaid "plus" factor cause nursing homes to reduce quality and substitute Medicaid patients for "private pay" patients. The increase in the "plus" factor raises the marginal profit of a Medicaid patient. Therefore, homes have incentive to substitue Medicaid patients for "private pay" patients. Homes reduce "private pay" demand and operating costs by lowering quality. These quality differences can be quite large. Specifically, in our sample, we find that homes who recieve high Medicaid "plus" factors provide hundreds of thousands of dollars <u>less</u> in goods and services than homes who recieve average Medicaid "plus" factors, certris paribus.

CON attempts to control nursing home expenditures by limiting the supply of beds with capacity constraints and entry barriers. CON policy makers are forced to trade off containing the size of the industry (and therefore total Medicaid payments) against quality and access. Specifically, we find that the capacity constraints and the reduced competition from the entry barriers lead to lower quality and fewer Medicaid patients receiving care.

The theoretical analysis is based on Gertler (1985a) and (1985b).[1] The model is based on the notion that there are quantity and quality aspects to production, and both quantity and quality are endogenous.[2] Specifically, nursing homes produce a series of commodities, such as medical care, room and board, and social activities. The quality of nursing home care is the utility patients derive from consuming this package. Nursing home output, then, is characterized by the total number of patients and average quality. Proprietary homes are assumed to maximize profits by choosing quality and "private pay" price (which determines the mix of "private pay" and Medicaid patients) subject to the CON capacity constraint. "Not for profit" homes are specified as utility maximizers subject to CON capacity and break even constraints.

The empirical analysis estimates a linear specification of the reduced form, but is complicated because quality is not directly observed. Instead of directly estimating the reduced form quality equation, we use the theory of production to specify a model in which quality is a latent variable, but the parameters of the reduced form quality equation are identified. The model has a Multiple Indicator Multiple Cause (MIMIC) interpretation, where the indicators are conditional input demands which have been filtered to remove all sources of variation except quality and random disturbances.[3]

We discuss the regulatory enviornment in section II, the theoretical model in section III, the empirical specification section IV, the data in section V, the empirical results in section V, and summarizes in section VI.

II. THE NURSING HOME INDUSTRY

The nursing home industry has expanded from approximately $190 million in 1950 to over $18 billion in 1980.[4] Most of the expansion took place after 1966, the year in which the Medicaid program began. As of 1980, the public share of nursing home expenditures was over 65%. Health care regulators have the task of trying to control this expansion, while simultaneously providing the poor with access to nursing home care and promoting a high standard of quality. The major forms of government intervention are the Medicaid patient subsidy program and the CON cost containment program.

Medicaid is an entitlement program established under the Social Security Act to provide the poor with a minimum floor of health services. Through direct subsidies, the Medicaid program makes health care available to individuals who otherwise could not afford it. It is jointly financed by State and Federal governments, but administered on a State basis. The Medicaid program reimburses nursing homes a set fee for the care of Medicaid patients. Typically, States pay nursing homes via "cost plus" reimbursement, although a few States have opted for a prospectively set flat reimbursement rate.

The CON cost containment program was passed into law in response to the rapid growth of the health care industry during the late 1960's and early 1970's. It 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". Effectively, CON limits the existing capacity of existing nursing homes and new entry into the market.[5] It was thought that the expansion could be contained by limiting the available supply of nursing home beds.

In essence, government regulation has turned nursing homes into price discriminators. The Medicaid program creates a second market for nursing home care, and CON restricts supply so that there is excess Medicaid patient demand. Therefore, Medicaid demand is perfectly elastic at the Medicaid reimbursement rate. The excess Medicaid demand hypothesis is supported empirically in Scanlon (1980).[6] Hence, nursing homes compete with each other for "private pay" patients knowing that they can always admit Medicaid patients at the Medicaid reimbursement rate if they have excess capacity.

III. A THEORY OF NURSING HOME BEHAVIOR

A. Assumptions and Notation

Nursing homes face "private pay" and Medicaid demand. "Private pay" demand is given by $X(P,Q)$, where X is the number of "private pay" patients, P is the price charged "private pay" patients, and Q is average quality. "Private pay" demand is increasing in Q, decreasing in P, and marginal "private pay" revenue is non-decreasing in quality. In contrast, Medicaid demand is perfectly elastic at the Medicaid reimbursement rate.

CON imposes a capacity constraint on each home. Since there is excess Medicaid demand, the constraint is binding. It is specified as

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

where M is the number of Medicaid patients and $\bar{X}$ is the CON allowed capacity.

Nursing homes are required to provide all patients with the same level of quality. Therefore, a nursing home's cost function can be specified as a function of the total number of patients receiving care and average quality. Let the cost function for providing quality level Q to $\bar{X}$ patients be given by $C(\bar{X},Q)$. It is assumed to be increasing and convex, the marginal cost of caring for another patient increasing in quality.

Finally, Medicaid reimburses a nursing home its average cost plus r, the Medicaid "plus" factor. Hence, the Medicaid reimbursement per patient is

$$R = r + C(\bar{X},Q)/\bar{X}. \tag{2}$$

B. Proprietary Nursing Home Behavior

1. Equilibrium

Homes choose "private pay" price and quality so as to maximize profits subject to the CON capacity constraint. The profit function is

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

The first order conditions are

$$PX_P + X = RX_P \tag{4}$$

$$PX_Q = (X/\bar{X})C_Q + RX_Q. \tag{5}$$

"Private pay" price is chosen in (4) such that marginal "private pay" revenue equals the opportunity cost of Medicaid revenue, and quality is chosen in (5) such that marginal "private pay" revenue equals the marginal cost of quality plus the opportunity cost of Medicaid revenue. Since the cost of caring for Medicaid patients is recovered via Medicaid reimbursement, the marginal cost of quality is weighted by the proportion of "private pay" patients.

2. Policy Comparative Statics

a. The Medicaid "Plus" Factor

An increase in the Medicaid "plus" factor causes nursing homes to lower quality, has an ambiguous effect on "private pay" price, and causes homes to increase their number of Medicaid patients at the expense of fewer "private pay" patients. The rationale behind this result is that an increase in r raises marginal Medicaid revenue, making Medicaid patients more profitable. Therefore, since the CON capacity constraint is binding, homes want to

substitute Medicaid patients for "private pay" patients. Homes can reduce "private pay" demand by increasng their "private pay" price and by lowering their quality. They surely lower quality, since that also reduces their operating costs. From (4), given quality, "private pay" price is increasing in R. Therefore, "private pay" price rises or falls depending on the effect of r on R. From (2), the increase in r has a positive direct effect on R, and a negative indirect effect via the reduction in average cost from the fall in quality. The fall in quality also lowers "private pay" marginal revenue. Therefore, from (4), "private pay" price rises (falls) if "private pay" marginal revenue falls more (less) than the net fall in R.

b. The CON Capacity Constraint

An increase in capacity creates the incentive for proprietary nursing homes to reduce quality, and has an ambiguous effect on "private pay" price. An increase in capacity raises the marginal cost of quality. Consequently, marginal "private pay" revenue becomes greater than the marginal cost of quality plus the opportunity cost of Medicaid revenue in (5). In response, nursing homes reduce quality. Again, "private pay" price rises or falls depending on the effect on R. The increase in capacity affects R through average cost. It has a positive direct effect on average cost, and a negative indirect effect via the fall in quality. Further, the fall in quality reduces marginal "private pay" revenue. Therefore, from (4), "private pay" price rises (falls) if "private pay" marginal revenue falls more (less) than R.

c. CON Entry policy

Entry increases competition for "private pay" patients, and thus reduces "private pay" demand and marginal revenue to each nursing home. In response, homes lower quality. The rise in quality increases both "private pay" marginal revenue and R. Hence, "private pay" price rises (falls) if marginal "private pay" revenue rises less (more) than the rise in R.

C. "Not For Profit" Nursing Home Behavior

1. Objectives

Unlike proprietary nursing homes, the objectives of "not for profit" homes are not well defined. Economists typically model "not for profit" firms as utility maximizers.[7] The arguments of a "not for profit" firm's utility function are debatable and depend upon the institutional setting. In the nursing home industry, where the religious institution dominates, we assume

that not for profit homes are basically altruistic in nature. Therefore, we expect these homes to be concerned with quality, and with providing care to the poor. Hence, the "not for profit" nursing home's utility function is assumed to be an increasing function of quality and the number of Medicaid patients. "Not for profit" nursing homes are assumed to choose "private pay" price and quality so as to maximize utility subject to the CON capacity constraint and subject to a break even constraint.[8]

2. Equilibrium

Let G(Q,M) be the nursing home's utility function, and λ the Lagrange multiplier on the break even constraint. Then, assuming that the Kuhn-Tucker conditions are are satisfied at an interior solution, the first order conditions are

$$(6) \qquad PX_P + X - (1/\lambda)G_M X_P = RX_P$$

$$(7) \qquad PX_P + (1/\lambda)(G_Q - G_M X_Q) = (X/\bar{X})C_Q + RX_Q.$$

"Private pay" price is chosen in (6) such that marginal "private pay" revenue plus the marginal utility of Medicaid patients equals the opportunity cost of Medicaid revenue, and quality is chosen in (7) such that the marginal "private pay" revenue plus the marginal utility of quality equals the marginal cost of quality and marginal opportunity cost of Medicaid revenue.

3. Policy Comparative Statics

Adjustments in the policy variables affect the "not for profit" nursing home's first order conditions in exactly the same way as they affected the proprietary first order conditions. Therefore, the directions of "not for profit" nursing homes responses to policy changes is the same as proprietary nursing homes responses, but magnitudes of response may differ.

IV. EMPIRICAL SPECIFICATION AND ECONOMETRIC METHODS

Here, we present methodology for empirically investigating the impact of Medicaid and CON policy on quality, "private pay" price, and patient mix via estimation of the reduced form. Except for the quality equation, estimation of the reduced form is straightforward. Since quality is not directly observed, the reduced form quality equation cannot be directly estimated. Instead, we specify a model in which quality is a latent variable but the parameters of the reduced form quality equation are identified.

A. THE REDUCED FORM

The reduced form assumes a linear solution to the equilibrium conditions. It specifies the endogenous variables to be linear functions of exogenous supply and demand variables, and of Medicaid and CON policy variables. Let the reduced form for the i^{th} nursing home be

$$(9) \qquad X_i = \beta_{10} + \sum_{j=1}^{J}\beta_{1j}Z_{ij} + \sum_{k=1}^{K}\beta_{1,J+k}W_{ij} + \epsilon_{1i}$$

$$(10) \qquad M_i = \beta_{20} + \sum_{j=1}^{J}\beta_{2j}Z_{ij} + \sum_{k=1}^{K}\beta_{2,J+k}W_{ij} + \epsilon_{2i} \qquad (i = 1,\ldots,n)$$

$$(11) \qquad P_i = \beta_{30} + \sum_{j=1}^{J}\beta_{3j}Z_{ij} + \sum_{k=1}^{K}\beta_{3,J+k}W_{ij} + \epsilon_{3i}$$

$$(12) \qquad Q_i = \beta_{40} + \sum_{j=1}^{J}\beta_{4j}Z_{ij} + \sum_{k=1}^{K}\beta_{4,J+k}W_{ij} + \epsilon_{4i},$$

where the Z_{ij}'s include exogenous demand variables, the Medicaid "plus" factor, and the market concentration level implied by CON policy. The W_{ij}'s are exogenous supply variables: input prices, capital stock, and the CON capacity constraint. Finally, the β_{ij}'s are unknown parameters, and the ϵ_{ij}'s are independently distributed random variables with zero mean.

A binding CON capacity constraint implies several restrictions on the reduced form. If the constraint is binding, then X_i and M_i sum to $\bar{X}_i$ for all i, implying that equations (9) and (10) sum to $\bar{X}_i$ for all i. Let W_{i1} be $\bar{X}_i$. Then, a binding CON capacity constraint implies

$$(13) \qquad \beta_{1j} = -\beta_{2j} \quad \text{for} \quad j = 0,1,\ldots,J,J+2,\ldots,K$$

$$(14) \qquad \beta_{1,J+1} = 1 - \beta_{2,J+1},$$

and a singular covariance matrix. These adding-up restrictions imply that equation (10) is redundant. Therefore, we exclude equation (10) from the estimation. The remaining equations have the same right hand side variables and no cross equation restrictions, which allows us to efficiently estimate (9) and (11) by least squares, and then recover the coefficients in (10) from the restrictions in (13) and (14).

B. THE REDUCED FORM QUALITY EQUATION

1. A Model of Quality and Factor Demand

Input demand functions depend on output quantities, input prices, and in the short run, capital stock. A nursing home's output can be characterized by the number of patients under its care, and the total amount of quality it provides all of its patients. Let φ_i be nursing home i's total quality level, and $Y_{i\ell}$ be nursing home i's demand for input ℓ. Suppose the input demand functions are linear. Then, nursing home i's input demand functions are

$$(15) \qquad Y_{i\ell} = \alpha_{0\ell} + \alpha_{\varphi\ell}\varphi_i + \sum_{k=1}^{K}\alpha_{k\ell}W_{ik} + \nu_{i\ell}, \quad (\ell = 1,\ldots,L),$$

where the α's are unknown coefficients and the $\nu_{i\ell}$'s are random disturbances. Total quality is just average quality times the total number of patients (i.e. $\bar{X}_i Q_i$). Therefore, from (12), the reduced form total quality equation is

$$(16) \qquad \varphi_i = \beta_{40}\bar{X}_i + \sum_{j=1}^{J}\beta_{4j}Z_{ij}\bar{X}_i + \sum_{k=1}^{K}\beta_{4,J+k}W_{ik}\bar{X}_i + \epsilon_{4i}\bar{X}_i,$$

Substitution of (16) into (15) gives the reduced form input demand equations

$$(17) \qquad Y_{i\ell} = \alpha_{0\ell} + \sum_{k=2}^{K}\alpha_{k\ell}W_{ik} + \gamma_{0\ell}\bar{X}_i + \sum_{j=1}^{J}\gamma_{j\ell}Z_{ij}\bar{X}_i + \sum_{k=1}^{K}\gamma_{J+k,\ell}W_{ij}\bar{X}_i + \eta_{i\ell}, \quad (\ell=1,\ldots,L),$$

where

$$(18) \qquad \eta_{i\ell} = \alpha_{1\ell}\bar{X}_i\epsilon_{4i} + \nu_{i\ell},$$

$$(19) \qquad \gamma_{0\ell} = \alpha_{1\ell} + \alpha_{\varphi\ell}\beta_{40},$$

$$(20) \qquad \gamma_{j\ell} = \alpha_{\varphi\ell}\beta_{4j} \quad \text{for} \quad j \neq 0.$$

2. Identification and Estimation

The reduced form quality and structural input demand equations are identified with the imposition of several restrictions on the reduced form input demand functions. First, quality must be normalized to some base. As of now, it is measured in arbitrary units. If we divide quality by the coefficient on quality in one of the input demand equations, then quality is measured in the same units as that input. This is equivalent to restricting

one of the $\alpha_{\varphi\ell}$'s to unity. Second, the intercept of the reduced form quality equation is identified by excluding $\bar{x}_i$ from one of the input demand functions. This assumption requires one of the input demands to depend only on total quality and not the mix of quality and number of patients. Finally, there are the cross equation restrictions implied by (19) and (20), which require the reduced form input demand equations to be proportional to one another in the coefficients on the exogenous variables in (16).

The reduced form quality and structural input demand equations are estimated jointly using a minimum distance procedure described in Chamberlain (1982). Chamberlain shows that this procedure consistently and efficeintly estimates a system of equations with nonlinear cross-equation restrictions and general heteroskedasticity, and derives χ^2 statistics for hypothesis testing.

3. Prediction and Inference

This model can be interpreted as a MIMIC model, with filtered input demands as indicators. The input demands are filtered to remove variation due to input prices, total number of patients, and capital stock. The remaining variation is due to quality and random disturbances. Therefore, the indicators and quality have the same covariation with the explanatory variables, but are measured in different units. The normalization bases quality, the latent variable, to the same scale as one of the indicators, and the proportionality constraints restrict the measurement model of quality to be a one-factor model. The model can be thought of as a multivariate regression of the filtered input demands against the explanatory variables with the right hand sides being proportional to one another.

Since the intercept is identified, an index of quality can be predicted for each home. These are indicies of input quantities which have been normalized to account for differences in input prices, total number of patients, and capital stock. Therefore, they measure the volume or intensity of services nursing homes provide their patients.

These measures of service intensity allow us to make inferences about quality. A nursing home's quality is utility patients derive from consuming its package of goods and services. A home can improve its quality by adjusting the composition of its package so as to be more in accordance with patients' preferences or by increasing the quantity of any commodity. Therefore, if patients prefer nursing services to social activities, the home can improve its quality without raising its operating costs by shifting resources from from social activities to nursing services.

Proprietary homes choose the quantity of each component to maximize profits. The more "private pay" patients are willing to pay for a particular component and the lower its marginal cost, the greater the equilibrium quantity of that component. If there is an exogenous increase in "private pay" patient demand, then the home invests in those components that yield the greatest marginal profit. Therefore, holding input prices constant, increases in service intensity raise patient utility. Since quality is the utility patients derive from consuming a nursing home's package, observed increases in a home's service intensity are tantamount to increases in quality. Hence, the estimated coefficients on the policy variables in (12) can be interpreted as partial effects on quality.

A similar argument can be posed for "not for profit" nursing homes. "Not for profit" nursing homes are characterized as maximizing utility subject to a break even constraint. Since the majority of "not for profit" nursing homes are operated by religious organizations, a major argument of their utility functions is likely to be quality of care. Therefore, one would expect "not for profit" homes to construct their package of goods and services in accordance with the preferences of their patients. Consequently, observed increases in a "not for profit" nursing home's service intensity are also tantamount to an increases in quality.

V. DATA

The data are constructed from New York State's 1980 survey of Long Term Care Facilities. The sample consists of 455 nursing homes chosen from 798 possible cases. Excluded were government homes, hospital attached homes, and non-reporting homes. In the sample are 288 proprietary and 167 "not for profit" nursing homes. Unless otherwise specified, the variables are daily averages, with the unit of observation being the nursing home. Descriptive statistics are presented in table 1.

In the reduced form, the dependent variables are "private pay" price, the number of Medicaid patients, and the number of private pay patients. The dependent variables in the input demand equations are 100's nursing labor hours, 100's of other labor hours, and a supplies quantity index.[9]

The exogenous supply variables are the input prices and capital stock. The input prices are the hourly nursing wage rate, the hourly other labor wage rate, and a supplies price index. 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 100,000's of 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, the proportion of "private pay" patients in the nursing home whose last residence before entering the nursing home was located in the same county in which the nursing home is located, and an index of health status of the patients in the nursing home. Income is measured in 1000's of dollars, and population in 10,000's of people. The income and population data come from the 1980 census. The proportion of "private pay" patients from the same county is a measure of the distance of the nursing home from the family and friends of its patients. Presumably, nursing homes that are located closer to its patients' family and friends are more attractive, ceteris paribus. The health index is really an index of ill-health.[10]

Since nursing homes compete only for "private pay" patients the appropriate market to analyze is the "private pay" patient market. Each home's geographic "private pay" patient market is somewhat complicated to measure since the data is reported on a county basis. The problem is that a nursing home's market may not be completely commensurate with the county in which it is located. In particular, homes that are located on county borders certainly compete for "private pay" patients from both counties. Instead, separate market areas are defined for each nursing home based on "private pay" patient census data. For each home, the survey reports the number of "private pay" patients from each county in New York State currently residing in the home. Homes participate in several county private pay patient 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 computation of the market variables.[11]

The policy variables are the Medicaid plus factor, the CON capacity constraint, and the concentration of the home's "private pay" patient market area. New York computes the plus factors based on owner's equity in the facility. Therefore, there is cross-sectional variation in the Medicaid plus factor. The CON capacity constraint is measured as the average daily census of patients in the home, and CON entry policy is captured by a Herfindahl index of the concentration of each home's "private pay" market.[12] Entry reduces the concentration of a home's "private pay" patient market.

VI. RESULTS

The models developed in section III were estimated separately for the proprietary and "not for profit" samples. The estimated proprietary reduced form equations are reported in table 6, the "not for profit" reduced form is reported in table 7, and the structural input demand equations are reported in tables 8 and 9. The estimates are quite reasonable. As expected, hypothesis tests, reported in section A, uniformily reject pooling the proprietary and "not for profit" samples, and accpet the restrcitions that identify the reduced form quality equation. In additon, the coefficients on the the policy variables are consistant with theory, and the signs on other independent variables such as own price in the input demand equations are generally as one would expect. The policy results are discussed in detail in section B, and are summarized in tables 2 through 5.

A. Pooling and Specification Tests

We begin by testing the hypothesis that the proprietary and "not for profit" samples can be pooled in the reduced form "private pay" price and "private pay" patients equations. The test statistics are 4.03 and 2.66, respectively, and are distributed F(12,431). The corresponding critical value at the .05 significance level is 1.77. Consequently, we reject pooling.

Before testing to see if the proprietary and "not for profit" reduced form quality and structural input demand equations can be pooled, we test to see if restrictions discussed in the identification section are valid. The test statistics are 20.08 for the proprietary sample and 16.68 for the "not for profit" sample, and are distributed $\chi^2(27)$. The corresponding critical value at the .05 significance level is 40.11. Consequently, we accept the hypothesis that the restrictions are valid. Under the assumption that the restrictions are valid, we test the hypothesis that the proprietary and "not for profit" samples can be pooled for the reduced form quality and structural input demand equations. That test statistic is 99.74, and is also distributed $\chi^2(27)$. Consequently, we reject pooling.

B. Comparative Statics

1. The Medicaid Plus Factor

The theoretical model predicts that an increase in the Medicaid "plus" factor causes nursing homes to reduce quality, adjust patient mix in favor of more Medicaid patients at the expense of "private pay" patients, and has an ambiguous effect on "private pay" price. As can be seen in table 2, these predictions are confirmed by the empirical results. The coefficients on the Medicaid "plus" factor in the both the proprietary and "not for profit" quality equations are indeed negative and significantly different from zero. Further, the coefficients are negative in both the proprietary and "not for profit" "private pay" patients equations, and are positive in the Medicaid patients equations (they are significantly different from zero in the proprietary reduced form, but insignificant in the "not for profit" reduced form). In addition, the coefficient is positive, but not significant, in the propietary "private pay" price equation, and is negative and significantly different form zero in the "not for profit" "private pay" price equation.

In summary, these results imply that an increase in the Medicaid "plus" factor causes proprietary nursing homes to reduce quality, possibly increase "private pay" price, and adjust patient mix in favor of more Medicaid patients. Furthermore, "not for profit" homes reduce quality and "private pay" price, and possibly adjust patient mix in favor of more Medicaid patients.

In order to gauge the magnitude of these effects, we compare predicted equilibria for small, medium, and large differences in the Medicaid "plus" factor. Table 3 reports predictions of the endogenous variables at the mean of the data, and for nursing homes whose Medicaid "plus" factor is five dollars, ten dollars, and fifteen dollars greater than the mean, respectively. These differences are observed within the sample, as the standard deviation of the Medicaid "plus" factor is 15.21. Deviations from the mean are also reported.

Consider the differences in quality for proprietary homes. The "mean" home provides 2.27 units of quality per patient, the "mean plus five" home produces 2.22 units, the "mean plus ten" home produces 2.17 units, and the "mean plus fifteen" home produces 2.12 units. To get a more interpretable measure of the magnitude of the quality differences, we translate these values into a home's total expenditures on goods and services provided to patients. In 1980, the average proprietary home total expenditure (variable costs) on goods and services provided to patients was 2,009 thousand dollars. Therefore, the average cost per unit quality was 885 thousand dollars. Assuming a constant marginal cost of quality we can extrapolate total expenditures for

the other homes: The "mean plus five" home provides 44 thousand dollars less in goods and services than the "mean" home, the "mean plus ten" home provides 89 thousand dollars less, and the "mean plus fifteen" home provides 133 thousand dollars less.

The "not for profit" quality differences are even larger. The "mean" home provides 2.77 units of quality per patient, the "mean plus five" home provides 2.70 units, the "mean plus ten" home provides 2.63 units, and the "mean plus fifteen" homes provides 2.56 units. Average total expenditures of "not for profit" homes over the sample period were 2,432 thousand dollars, and therefore, the average cost per unit quality was 878 thousand dollars. Assuming a constant marginal cost of quality, the "mean plus five" home provides 61 thousand dollars less in goods and services than the "mean" home, the "mean plus ten" home provides 123 thousand dollars less, and the "mean plus fifteen" home provides 184 thousand dollars less.

Not surprisingly, there is almost no difference in the proprietary "private pay" prices. On the other hand, the "not for profit" prices show substantial differences; The "mean plus five" home charges "private pay" patients 5% less than the "mean" home, the "mean plus ten" home charges 10% less, and the "mean plus fifteen" homes charges 15% less.

Finally, consider the differences in patient mix as represented by the ratio of the number of Medicaid to "private pay" patients. For proprietary homes, the "mean plus five" home has a ratio 13% higher than the mean home, the "mean plus ten" home has a ratio 30% higher, and the "mean plus fifteen" home has a ratio 50% higher. For "not for profit" homes, the "mean plus five" home has a ratio 8% higher than the "mean" home, the "mean plus ten" home has a ratio 16% higher, and the "mean plus fifteen" home has a ratio 26% higher.

2. The CON Capacity Constraint

Theory predicts that an increase in capacity causes nursing homes to lower quality, and has an indeterminate effect on "private pay" price and patient mix. Again, the empirical results are consistent with the theoretical predictions. Since the CON capacity constraint is binding, the effect of constraint is captured by the "total number of patients" variable. The coefficient on this variable is negative and significantly different from zero in the proprietary quality equation, and negative but insignificant in the "not for profit" quality equation. It is positive in the proprietary "private pay" price equation, is negative in the "not for profit" "private pay" price equation, and insignificant in both. In addition, the coefficient is positive

and significantly different from zero in proprietary "private pay" patients and Medicaid patients equations, is positive and significant in the "not for profit" Medicaid patients equation, and is negative but insignificant in the "not for profit" "private pay" patients equation.

In summary, additional capacity causes proprietary homes to provide lower quality, possibly charge higher "private pay" prices, and fill approximately ten percent of new capacity with "private pay" patients and ninety percent with Medicaid patients. "Not for profit" nursing homes may provide lower quality, may charge lower "private pay" prices, and fill 100 per cent of new capacity with Medicaid patients.

We gauge the magnitude of these effects by comparing predictions of the endogenous variables at the mean of the data to small, medium, and large differences in capacity. Table 4 reports predictions at the mean of the data, at the mean plus 25 patients, at the mean plus 50 patients, and at the mean plus 75 patients. Again these differences are observed in the sample, as the standard deviation of the "total number of patients" variable is 94.04. Deviations from the mean are also reported beneath the predicted value.

Consider the differences in quality. The "mean" proprietary home provides 2.27 units of quality per patient, the "mean plus 25" home provides 2.25 units, the "mean plus 50" home provides 2.23 units, and the "mean plus 75" home provides 2.21 units. Translating these differences into total expenditures on goods and services, we find that the "mean plus 25" home provides 17 thousand dollars less in goods and services than the "mean" home, the "mean plus 50" home provides 34 thousand dollars less, and the "mean plus 75" home provides 51 thousand dollars less. Turning to "not for profit" homes, the "mean" home provides 2.77 units of quality, the "mean plus 25" home provides 2.74 units, the "mean plus 50" home provides 2.70 units, and the "mean plus 75" provides 2.62 units. In terms of expenditures on goods and services the "mean plus 25" home provides 30 thousand dollars less than the " mean home, the "mean plus 50" home provides 60 thousand dollars less, and the "mean plus 75" home provides 90 thousand dollars less.

Homes of all sizes charge the same "private pay" prices, but larger homes have higher Medicaid to "private pay" patient ratios. In the proprietary case, the "mean plus 25" home has a ratio 13% higher than the "mean" home, the "mean plus 50" home has a ratio 25% higher, and the "mean plus 75" home has a ratio 35% higher. In the "not for profit" case, the "mean plus 25" home has a ratio 27% higher than the "mean" home, the "mean plus 50" home has a ratio 55% higher, and the "mean plus 75" home has a ratio 84% higher.

3. Entry

Entry into the market reduces the market's concentration. Hence, CON entry policy can be analyzed by looking at the coefficients on the market concentration index. Theory predicts that an increase in concentration causes nursing homes to lower quality, and has an indeterminate effect on "private pay" price and patient mix. The empirical results in the proprietary model are consistent with theory. In the proprietary reduced form, the coefficients on the market concentration index are negative and significantly different from zero in the quality, "private pay" price, and "private pay" patients equations, and is positive and significant in the proprietary Medicaid patients equation. Hence, entry causes proprietary home to raise quality, raise "private pay" prices, and to substitute Medicaid for "private pay" patients.

On the other hand, all the coefficients on the concentration index in the "not for profit" reduced form equations are positive and not significantly different from zero. Alternatively, it may be the case that potential "not for profit" patients do not view proprietary and "not for profit" nursing homes care as close substitutes. This would suggest that proprietary and "not for profit" nursing homes do not compete in the same markets even if they are located geographically close to one another. Hence, a joint index of concentration heavily weighted towards the proprietary homes market would be relevant for proprietary endogenous variables, but not for the "not for profit" homes.

Again, we gauge the magnitude of these effects for proprietary homes by comparing predictions of the endogenous variables at the mean of the data to predictions for small, medium, and large differences in market concentration. Table 5 reports the predictions at the mean concentration level, at the mean plus .01, at the plus .05, and at the mean plus .1. As usual, these differences are observed within the sample. The "mean plus .01" home provides 10 thousand dollars less in goods and services than then "mean" home, the "mean plus .05" home provides 52 thousand dollars less, and the "mean plus .1" home provides 105 thousand dollars less. On the other hand, increases in concentration appear to have little effect on "private pay" price and patient mix.

VII. CONCLUSIONS

Health care regulators are concerned with assuring a high standard of quality, providing the poor with access to care, and controling the expansion of the industry. With these goals in mind, this paper has analyzed effect of Medicaid and CON policy on proprietary and "not for profit" nursing home behavior.

We find that Medicaid policy makers are faced with a quality-access trade-off. Specifically, nursing homes whose Medicaid reimbursement rates include higher Medicaid "plus" factors care for more Medicaid patients, but provide lower quality. The empirical work suggests that homes with high "plus" factors provide substantially lower quality than homes with mean "plus" factors. These quality differences when translated into nursing home expenditures on goods and services provided patients are observed to be in the hundreds of thousands of dollars. Further, high "plus" factor homes have Medicaid to "private pay" patient ratios possibly 50% higher than mean "plus" factor homes.

We also find that CON policy makers must trade off containing the size of the industry (and therefore total Medicaid payments) against quality and access. Specifically, we find that the capacity constraints and the reduced competition from the entry barriers lead to lower quality and fewer Medicaid patients receiving care.

Finally, we observe differences in proprietary and "not for profit" responses to regulatory policy. Both types of homes adjust quality and patient mix in the same direction, but in different magnitudes. "Not for profit" homes tend to have larger quality responses. On the other hand, they have opposite "private pay" price responses.

FOOTNOTES

[1] See these papers for proofs of theoretical results in this paper.

[2] This representation of a firm's output is similar to general models analyzed in Spence (1975), Sheshinski (1976), and Leffler (1982), and to nursing home models analyzed in Bishop (1980) and Palmer and Vogel (1983).

[3] See Joreskog and Goldberger (1975) for a discussion of MIMIC models, and Aigner et. al. (1984) for a general survey of latent variable models.

[4] The source of statistics referenced in this section is The U.S. Department of Health and Human Services' publication, Health, United States 1980.

[5] The CON review boards are not just rubber stamps. Indeed, there is some casual evidence in support of binding CON capacity and entry constraints. First, most nursing homes operate above 90% capacity. Second, there is a long list of individuals in hospitals waiting for nursing home openings. Finally, States such New York have imposed moratoriums on nursing home expansion.

[6] Scanlon tests and accepts the hypothesis that there is excess Medicaid patient demand for nursing home care. This is consistent with the facts cited in footnote 5.

[7] For example see Hansmann (1981), Newhouse (1970), and Pauly and Redisch (1973)

[8] There are several alternatives to modeling "not for profit" nursing homes in this fashion. Some "not for profit" homes could be profit maximizers who have obtained "not for profit" legal status in order to take advantage of the tax breaks. In this case, profits are taken in the form of salary and rent. Other non-altruist "not for profit" homes, could be operated by non-owner managers who are personal utility maximizers. These managers may manipulate the operation of the home so as to maximize their own income, prestige, and security. The result is an inefficient employment of resources. Hence, these homes are not cost minimizers. This case is discussed in Frech and Ginsburg (1980). The altruism assumption suggests cost minimization.

[9] The supplies quantity index is calculated as the total expenditures on supplies divided by an index of the price of supplies. The supplies price index is a weighted average of the prices of the commodities that constitute nursing home supplies. These commodities are drugs, other medical supplies, food, energy, and other supplies. The prices of these commodities are national price indices in 1977 dollars, and are reported in the Department of Health and Human Services report, HEALTH CARE FINANCING TRENDS, 1980. The weights are the proportion of a home's total supplies expenditures accounted for by the particular commodity.

[10] The health status index is computed from disability scores assigned patients. The disabilty level of each patient in eight functional areas is reported in the survey. The disabilty level in each functional area takes on one of three values: self care, partial care, and total care. The functional areas are walking, transferring, wheeling, eating, toileting, bathing, dressing, and breathing. Walking, transferring, and wheeling were treated as mutually exclusive categories. Each home reports the number of patients in each cell, where a cell is defined by functional area and disability level. The cells are then aggregated by disability level. After that, the self care aggregate is multiplied by zero, the partial help aggregate by seven, and the total help aggregate by fourteen. The scores are then summed and divided by the total number of patients times 100. The result is an index of the average ill-health of the patients in a facility. This index is used for the purposes of quality control (see Ullmann (1983)).

[11] For each home, the 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 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, using the same weights.

[12] Since each county is treated as a separate market, and each home participates in several county markets, the concentration of a home's private pay patient market depends upon its degree of participation in the various county markets. Therefore, the concentration level of a home's private pay patient market is a weighted sum of the county market concentration levels, using the home's proportion of private pay patients from each county as weights. The concentration of a county private pay patient market is computed using a Herfindahl index, which is based on each home's share (proportion) of a county's private pay patients. Specifically, it is the sum of squared shares (see Scherer (1980) pp. 58). Entry reduces the value of this index.

REFERENCES

Aigner, D., C. Hsaio, A. Kapteyn, and T. Wansbeek (1984), "Latent Variable Models in Econometrics," in the Handbook of Econometrics Vol. 2edited by Z. Griliches and M. Intriligator, North-Holland, Amsterdam. pp.1321-1393.

Bishop, C. E. (1980), "Nursing Home Cost Studies and Reimbursement Issues," Health Care Financing Review, Vol. 2, pp. 47-64.

Chamberlain, G. (1982), "Multivariate Models for Panel Data," Journal of Econometrics, Vol. 18, pp. 5-46.

Frech, H. E., and P. B. Ginsburg (1980), "The Cost of Nursing Home Care in the United States: Government Financing, Ownership, and Efficiency," in Health, Economics, and Health Economics, edited by J. Van der Gaag and M. Perlman, North Holland, Amsterdam, pp. 67-81.

Gertler, P. J. (1985a), "Subsidies, Quality, and Regulation in the Nursing Home Industry," unpublished Ph.d dissertation, Department of Economics, University of Wisconsin at Madison.

Gertler, P. J. (1985b), "Regulated Price Discrimination and Quality: The Implications of Medicaid Reimbursement Policy for the Nuring Home Industry," Working Paper No. 267, Department of Economics, State University of New York at Stony Brook.

Hansmann, H. (1981), "Non-Profit Enterprises in the Performing Arts," Bell Journal of Economics, Vol. 12, pp. 341-361.

Joreskog, K. and A. S. Goldberger (1975), "Estimation of a Model with Multiple Indicators and Multiple Causes of a Single Latent Variable," Journal of the American Statistical Association, Vol. 70, pp. 631-639.

Klein, B. and K. B. Leffler (1981), "The Role of Market Forces in Assuring Contractual Performance," The Journal of Political Economy, Vol.89, pp. 615-641.

Leffler, K. D. (1982), "Ambiguous Changes in Product Quality," American Economic Review, Vol. 72, pp. 956-967.

Newhouse, J. P. (1970), "Towards a Theory of Non-Profit Institutions: An Economic Model of a Hospital,"American Economic Review, Vol. 60, pp. 64-75.

New York State Department of Health, Office of Health Systems Management (1980), "Title XIX Nursing Home Cost Survey."

Palmer, H. C. and R. J. Vogel (1983), "Models of the Nursing Home" in Long-Term Care: Perspectives From Research and Demonstrations, edited by R. J. Vogel and H. C. Palmer, Health Care Financing Administration, U.S. Department of Health and Human Services.

Pauly, M., and M. Redisch (1973), "The Not for Profit Hospital as a Physicans' Cooperative," American Economic Review, Vol. 63, pp. 87-100.

Scanlon, W. J. (1980), "The Market for Nursing Home Care: A Case of an Equilibrium with Excess Demand as a Result of Public Policy," unpublished Ph.d dissertation, Department of Economics, University of Wisconsin at Madison.

Scherer, F. M. (1980), Industrial Market Structure and Economic Performance, Rand-McNally.

Sheshinski, E. (1976), "Price, Quality, and Quantity Regulation in Monopoly Situations," Economica, Vol. 43, pp. 417-429.

Spence, M. (1975), "Monopoly, Quality, and Regulation," Bell Journal of Economics, Vol. 6, pp. 417-429.

Ullmann, S. G. (1983), "Cost Analysis and Facility Reimbursement in the Long-Term Health Care Industry," Department of Economics Working Paper, University of Miami.

U. S. Department of Health and Human Services, Health, United States 1980, U. S. Government Printing Office.

Waldo, D. R. (1981), Health Care Financing Trends, Health Care Financing Agency, Bureau of Data Management and Strategy

TABLE 1

DESCRIPTIVE STATISTICS: MEANS AND STANDARD DEVIATIONS

VARIABLE	ALL HOMES	PROPRIETARY	NOT FOR PROFIT
1. Private pay price	59.50 (19.42)	59.87 (17.68)	58.88 (22.15)
2. Medicaid Patients	100.05 (90.67)	99.17 (85.88)	102.81 (98.61)
3. Private Pay Patients	23.96 (20.49)	25.44 (18.81)	21.40 (22.95)
4. Nursing labor Hours	315.09 (266.27)	313.20 (224.27)	318.36 (327.01)
5. Other Labor Hours	216.18 (176.39)	189.62 (125.88)	261.99 (233.15)
6. Supplies Quantity Index	2.50 (2.04)	2.60 (2.18)	2.32 (1.78)
7. Nursing Hourly Wage	7.82 (2.75)	7.67 (2.84)	8.06 (2.59)
8. Other labor Hourly Wage	8.78 (2.78)	7.97 (2.44)	8.79 (3.23)
9. Supplies Price	1.41 (.10)	1.38 (.03)	1.44 (.15)
10. Capital Stock	6.86 (25.51)	7.04 (31.77)	6.54 (5.84)
11. Per Capita Income	7.15 (1.40)	7.08 (1.44)	7.27 (1.32)
12. Population Over 65	1.07 (.88)	.98 (.87)	1.23 (.87)
13. % Patients Same County	.74 (.26)	.77 (.24)	.70 (.30)
14. Health Status Index	1.43 (.61)	1.51 (.57)	1.31 (.67)
15. Medicaid Plus Factor	15.41 (15.21)	18.35 (13.96)	10.34 (15.96)
16. Total Patients	124.21 (94.04)	124.61 (89.33)	124.01 (101.94)
17. Market Concentration	.12 (.11)	.12 (.12)	.11 (.09)
18. # of Observations	455	288	167

TABLE 2

ESTIMATED COEFFICIENTS AND t-STATISTICS ON MEDICAID AND CON POLICY VARIABLES

ENDOGENOUS VARIABLE	POLICY VARIABLE					
	MEDICAID "PLUS" FACTOR		CON CAPACITY CONSTRAINT		MARKET CONCENTRATION	
	PROFIT	NON-PROFIT	PROFIT	NON-PROFIT	PROFIT	NON-PROFIT
AVERAGE QUALITY	-.010* (2.107)	-.014 * (2.135)	-.077*+ (3.029)	-.137+ (1.138)	-1.182* (4.125)	.141 (.216)
"PRIVATE PAY" PRICE	.045 (.204)	-.594* (2.623)	.012 (1.118)	-.014 (.420)	-18.612** (1.879)	19.288 (.840)
"PRIVATE PAY" PATIENTS	-.489* (1.963)	-.253 (1.000)	.086* (6.872)	-.016 (.433)	-33.221* (2.956)	-33.901 (1.318)
MEDICAID PATIENTS	.489* (1.963)	.253 (1.000)	.913* (72.820)	1.016* (26.835)	33.221* (2.956)	33.901 (1.318)

*Significantly different from Zero at the .05 level
**Significantly different from Zero at the .1 level
+Independent Variable is measued in hundreds of patients

TABLE 3

COMPARATIVE STATICS - THE MEDICAID "PLUS" FACTOR

PROPRIETARY HOMES

	MEAN	MEAN + $5	MEAN + $10	MEAN + $15
MEDICAID PLUS	$18.35	$23.35 +27.25%	$28.35 +54.50%	$33.35 +81.74%
QUALITY INDEX	2.27	2.22 -2.20%	2.17 -4.41%	2.12 -6.61%
TOTAL EXPENDITURES*	$2,009	$1,965 -$44	$1,920 -$89	$1,876 -$133
PRIVATE PAY PRICE	$59.89	$60.12 +0.38%	$60.34 +0.75%	$60.57 +1.13%
PATIENT MIX RATIO	3.90	4.42 +13.31%	5.06 +29.84%	5.88 +50.84%
PRIVATE PAY PATIENTS	25.44	23.00 -9.61%	20.55 -19.22%	18.11 -28.83%
MEDICAID PATIENTS	99.17	101.62 +2.35%	104.06 +4.93%	106.51 +6.89%

"NOT FOR PROFIT" HOMES

	MEAN	MEAN + $5	MEAN + $10	MEAN + $15
MEDICAID PLUS	$10.34	$23.35 +125.82%	$20.34 +96.71%	$25.34 +145.07%
QUALITY INDEX	2.77	2.70 -2.53%	2.63 -5.05%	2.56 -7.58%
TOTAL EXPENDITURES*	$2,432	$2,371 -$61	$2,309 -$123	$2,248 -$184
PRIVATE PAY PRICE	$59.86	$56.89 -4.96%	$53.92 -9.92%	$50.95 -14.88%
PATIENT MIX RATIO	4.80	5.17 +7.59%	5.58 +16.20%	6.06 +26.04%
PRIVATE PAY PATIENTS	21.40	20.14 -5.91%	18.87 -11.82%	17.60 -17.73%
MEDICAID PATIENTS	102.81	104.08 +1.20%	105.34 +2.46%	106.61 +3.56%

* TOTAL EXPENDITURES are measured in $1,000.

TABLE 4

COMPARATIVE STATICS - THE CON CAPACITY CONSTRAINT

PROPRIETARY HOMES

	MEAN	MEAN + 25	MEAN + 50	MEAN + 75
TOTAL # OF PATIENTS	124.61	124.61 +20.06%	149.61 +60.19%	199.61 +60.19%
QUALITY INDEX	2.27	2.25 -0.85%	2.23 -1.70%	2.21 -2.54%
TOTAL EXPENDITURES*	$2,009	$1,992 -$17	$1,975 -$34	$1,958 -$51
PRIVATE PAY PRICE	$59.89	$60.19 +0.50%	$60.49 +1.00%	$60.79 +1.50%
PATIENT MIX RATIO	3.90	4.42 +13.38%	4.87 +24.86%	5.26 +34.79%
PRIVATE PAY PATIENTS	25.44	27.59 +8.45%	29.74 +16.90%	31.89 +25.35%
MEDICAID PATIENTS	99.17	122.00 +15.76%	144.82 +46.03%	167.65 +40.85%

"NOT FOR PROFIT" HOMES

	MEAN	MEAN + 25	MEAN + 50	MEAN + 75
TOTAL # OF PATIENTS	124.01	149.01 +20.16%	199.01 +60.48%	199.01 +60.48%
QUALITY INDEX	2.77	2.74 -1.24%	2.70 -2.47%	2.67 -3.71%
TOTAL EXPENDITURES*	$2,432	$2,402 -$30	$2,372 -$60	$2,342 -$90
PRIVATE PAY PRICE	$59.86	$59.51 -0.58%	$59.16 -1.17%	$58.81 -1.75%
PATIENT MIX RATIO	4.80	6.11 +27.08%	7.46 +55.21%	8.86 +84.46%
PRIVATE PAY PATIENTS	21.40	21.00 -1.87%	20.60 -3.74%	20.20 -5.61%
MEDICAID PATIENTS	102.81	128.21 +24.74%	153.61 +49.41%	179.01 +42.57%

* TOTAL EXPENDITURES are measured in $1,000.

TABLE 5
COMPARATIVE STATICS - CON ENTRY POLICY

PROPRIETARY HOMES

	MEAN	MEAN + .01	MEAN + .05	MEAN + .1
CONCENTRATION INDEX	0.12	0.13 +8.33%	0.17 +41.67%	0.22 +83.33%
QUALITY INDEX	2.27	2.26 -0.52%	2.21 -2.60%	2.15 -5.22%
TOTAL EXPENDITURES*	$2,009	$1,999 -$10	$1,957 -$52	$1,904 -$105
PRIVATE PAY PRICE	$59.89	$59.70 -0.31%	$58.96 -1.55%	$58.03 -3.11%
PATIENT MIX RATIO	3.90	3.96 +1.62%	4.24 +8.73%	4.63 +18.82%
PRIVATE PAY PATIENTS	25.44	25.11 -1.31%	23.78 -6.53%	22.12 -13.06%
MEDICAID PATIENTS	99.17	99.50 +0.33%	100.83 +1.67%	102.49 +3.34%

"NOT FOR PROFIT" HOMES

	MEAN	MEAN + .01	MEAN + .05	MEAN + .1
CONCENTRATION INDEX	0.11	0.12 +9.09%	0.16 +45.45%	0.21 +90.91%
QUALITY INDEX	2.77	2.77 +0.05%	2.78 +0.25%	2.78 +0.51%
TOTAL EXPENDITURES*	$2,432	$2,433 +$1	$2,438 +$6	$2,444 +$12
PRIVATE PAY PRICE	$59.86	$60.05 +0.32%	$60.82 +1.61%	$61.79 +3.22%
PATIENT MIX RATIO	4.80	4.90 +1.94%	5.30 +10.39%	5.90 +22.74%
PRIVATE PAY PATIENTS	21.40	21.06 -1.58%	19.70 -7.92%	18.01 -15.84%
MEDICAID PATIENTS	102.81	103.15 +0.33%	104.51 +1.65%	106.20 +3.28%

* TOTAL EXPENDITURES are measured in $1,000.

TABLE 6
PROPRIETARY REDUCED FORM
ESTIMATED COEFFICIENTS AND T-STATISTICS IN PARENTHESES

INDEPENDENT VARIABLE	"PRIVATE PAY" PRICE	AVERAGE QUALITY	"PRIVATE PAY" PATIENTS
1. CONSTANT	89.22 (2.06)	.51 (.36)	22.68 (.46)
2. TOTAL # OF PATIENTS	.01 (1.12)	-.08 (1.52)	.09 (6.87)
3. NURSING HOURLY WAGE	2.11 (2.31)	-.14 (3.03)	-3.57 (3.44)
4. OTHER LABOR'S HOURLY WAGE	1.48 (1.51)	.04 (.86)	.75 (.68)
5. SUPPLIES PRICE	-41.73 (1.35)	.58 (.56)	-7.07 (.20)
6. CAPITAL STOCK	.04 (1.65)	.02 (1.70)	.02 (.65)
7. HEALTH STATUS	7.69 (4.48)	1.27 (29.98)	3.25 (1.66)
8. INCOME	.40 (.57)	.04 (3.00)	3.33 (4.21)
9. POPULATION	-4.23 (2.51)	-.04 (4.01)	-3.32 (1.91)
10. MEDICAID PLUS FACTOR	.05 (.20)	-.01 (2.11)	-.49 (1.96)
11. % PATIENTS SAME COUNTY	-12.51 (3.45)	.19 (2.21)	6.95 (1.69)
12. MARKET CONCENTRATION	-18.61 (1.88)	-1.18 (4.12)	- 33.22 (2.96)
13. R-SQUARED	.39	-	.97

TABLE 7
"NOT FOR PROFIT" REDUCED FORM
ESTIMATED COEFFICIENTS AND T-STATISTICS IN PARENTHESES

	INDEPENDENT VARIABLE	"PRIVATE PAY" PRICE	AVERAGE QUALITY	"PRIVATE PAY" PATIENTS
1.	CONSTANT	18.81 (.92)	.21 (.26)	69.94 (3.04)
2.	TOTAL # OF PATIENTS	-.01 (.42)	-.14 (1.14)	-.01 (.43)
3.	NURSING HOURLY WAGE	1.04 (.84)	.06 (.81)	-.83 (.60)
4.	OTHER LABOR'S HOURLY WAGE	.67 (.61)	-.18 (2.98)	-1.02 (.84)
5.	SUPPLIES PRICE	-5.33 (.42)	.69 (1.38)	-29.55 (2.06)
6.	CAPITAL STOCK	1.21 (2.10)	.04 (1.88)	2.57 (3.98)
7.	HEALTH STATUS	15.49 (6.65)	1.62 (23.30)	-8.96 (3.44)
8.	INCOME	.87 (.73)	.06 (1.96)	1.57 (1.17)
9.	POPULATION	4.59 (1.71)	-.05 (.66)	-7.09 (2.35)
10.	MEDICAID PLUS FACTOR	-.59 (2.62)	-.01 (2.13)	-.25 (1.00)
11.	% PATIENTS SAME COUNTY	-6.43 (1.38)	.29 (2.05)	12.56 (2.41)
12.	MARKET CONCENTRATION	19.29 (.84)	.14 (.21)	33.90 (1.32)
13.	R-SQUARED	.48		.97

TABLE 8
PROPRIETARY INPUT DEMAND EQUATIONS

INDEPENDENT VARIABLE	NURSING HOURS	OTHER LABOR HOURS	SUPPLIES
1. CONSTANT	3.39 (1.37)	-2.92 (2.78)	16.38 (6.12)
2. TOTAL QUALITY	1.00* -	.24 (12.41)	.04 (.75)
3. TOTAL # OF PATIENTS	.00** -	.86 (16.38)	2.04 (12.76)
4. NURSING HOURLY WAGE	.02 (.44)	.00 (.31)	.14 (2.90)
5. OTHER LABOR'S HOURLY WAGE	-.05 (.91)	-.10 (3.95)	-.11 (1.92)
6. SUPPLIES PRICE	-2.20 (1.22)	(3.45)	-12.01 (6.14)
7. CAPITAL STOCK	-.03 (1.72)	-.04 (9.47)	-.00 (.60)

TABLE 9
"NOT FOR PROFIT" INPUT DEMAND EQUATIONS

INDEPENDENT VARIABLE	NURSING HOURS	OTHER LABOR HOURS	SUPPLIES
1. CONSTANT	.21 (.26)	-1.85 (2.87)	6.61 (9.46)
2. TOTAL QUALITY	1.00 -	.26 (7.77)	.08 (2.00)
3. TOTAL # OF PATIENTS	.00** -	1.21 (7.61)	1.62 (8.89)
4. NURSING HOURLY WAGE	-.17 (2.75)	.07 (1.92)	.01 (.21)
5. OTHER LABOR'S HOURLY WAGE	.18 (2.99)	-.06 (1.86)	.07 (1.89)
6. SUPPLIES PRICE	-.83 (1.08)	-.04 (2.76)	-4.91 (9.08)
7. CAPITAL STOCK	.00 (.08)	.03 (1.19)	-.01 (.48)

* Coefficient restricted to unity.
** Coefficient restricted to zero.