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Asymmetric Information and the Not-for-Profit Sector

Does Its Output Sell at a Premium?

Tomas Philipson

10.1 Introduction

The not-for-profit sector is responsible for a large amount of economic activity that economists have considered to be of primary importance; it is estimated to conduct a fifth of research and development (R&D) and accounts for almost all production of high-skill human capital outside on-the-job training and the vast majority of the health care produced worldwide. In the United States, the growing not-for-profit economy employs about 10 percent of the labor force.[1] About half of the total employment in the not-for-profit sector is in health services, concentrated in hospitals, of which 85 percent of employment is not-for-profit. Education and research make up the second largest component of not-for-profit employment, about 20 percent, followed by social services, such as child care and job training, which make up about 15 percent of the not-for-profit labor force.

This importance of the not-for-profit economy in the United States and elsewhere has generated a large theoretical and empirical literature on the positive behavior and normative role of not-for-profit institutions in eco-

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1. See Rudney (1987).

nomic activity in general and in health care in particular.[2] The two major strands of this literature attempt to either qualitatively justify the efficiency role of not-for-profit regulations or to draw out and empirically investigate behavioral differences between these types of institutions and more traditional ones.

One of the major efficiency rationales put forward for the value of not-for-profit production in health care is that it solves an asymmetric information problem between uninformed consumers and informed producers.[3] The argument is that when quality of supply is unobservable, a producer who is constrained to not have profits has lower agency costs than an unconstrained producer. This agency explanation for the efficiency gains of not-for-profits is essentially an argument that the output of not-for-profit firms is not perfectly substitutable with that of for-profit firms. Although the empirical content of this argument, beyond the existence of not-for-profits, has not been the focus of previous analysis, this paper attempts to test the information asymmetry explanation of not-for-profits. Our basic argument is that there should be a not-for-profit premium if this asymmetry is important. We test this implication against the alternative prediction that regulatory status is perfectly substitutable on the demand side. Consumers do not care about the profit status of the firm per se, only indirectly through the price or the observable quality of its output.[4] A well-known equilibrium argument is that a *necessary* condition for two perfect substitutes to be sold in equilibrium—that is, for not-for-profits and profits to coexist—is that they be priced equally. Consumers would not hold the more expensive substitute. This implication holds in standard hedonic models as well, when consumers may have heterogeneous preferences regarding other attributes, as long as all consumers are indifferent between organizational forms per se. We apply this simple argument empirically to the case of the mixed production taking place in the U.S. long-term care market. Although the basic argument seems very general, there are a few caveats when applying it to the long-term care industry in the United States, the main one being supply constraints limiting consumer substitutability.

Testing the difference between the information asymmetry prediction and perfect substitutability is operationalized empirically as follows. In a cross section of firms, perfect substitutability implies that if one runs a hedonic price regression controlling for the observable qualities of the good, a dummy variable that indicates the not-for-profit status of the pro-

2. For general discussion see, e.g., Weisbrod (1977, 1987, 1988), Powell (1987), Hansmann (1980), Rose-Ackerman (1986, 1996), and the references contained therein. For discussion of not-for-profit behavior in health care, see, e.g., Newhouse (1970), Pauly and Redisch (1973), Becker and Sloan (1985), and Sloan (1997). Gertler (1989) and Gertler and Waldman (1992) address the nursing home industry discussed here.

3. See, e.g., Weisbrod (1987), Easly and O'Hara (1983), or the review in Hansmann (1987).

4. Indeed, one may conjecture that most consumers, like most economists, are unable to define exactly what a not-for-profit is.

ducer should have a zero effect. In other words, controlling for *observed* quality, price is not affected by organizational status. Note that this is a necessary condition of equilibrium with mixed production of both organizational forms. It says that if we observe two nursing homes that offer the same observable services, as controlling for quality in a regression attempts to do, then they must be priced the same, independent of the status of the producer. It is not a sufficient condition of equilibrium, since it may be that, as an implication of this perfect substitutability, we only observe the lowest-cost organizational form, as would be the case, for example, under the common assumption of constant returns to scale in industrywide cost functions. In contrast, if agency costs were lower in not-for-profits, in a mixed industry in which the two organizational forms were equally priced or in which for-profits sold at a premium, complete substitution toward not-for-profits would be observed. To summarize, in a hedonic price regression on quality and organizational form, the informational role of not-for-profits would imply a positive independent effect of a not-for-profit dummy.

We attempt to distinguish between these two implications using data on the U.S. long-term care industry during the last two decades. The empirical analysis is based on pricing behavior as reported in the two latest cross sections, 1985 and 1995, of the National Nursing Home Survey (NNHS). NNHS is a continuing series of national sample surveys of nursing homes, their residents, and their staff. The two years display somewhat different results regarding the premia for organizational form. Overall, 1985 provides more support for the argument that for-profit care sells at about a 5 percent premium, as opposed to 1995, which indicates support for the perfect substitutability implication of no premium in either direction. The results also differ across the types of care offered. In particular, for residential care, the premia for for-profit care are the largest and the most significant. However, for no year or type of care does the not-for-profit premium become significantly positive. Our main finding is therefore that if asymmetric information arguments about not-for-profits imply that they must sell at a premium in a mixed industry, this evidence does not seem to offer support for this implication.

The paper may be briefly outlined as follows. Section 10.2 briefly discusses econometric aspects of the not-for-profit effects of interest, centering on the particular effect discussed here concerning perfect substitutability. Section 10.3 then summarizes the aggregate trends in quantities and prices for the U.S. nursing home industry by for-profit versus not-for-profit status. These aggregates tend to provide the same results as the firm-level data. Section 10.4 thereafter considers the perfect substitutability hypothesis firm-level data on nursing homes using the National Nursing Home Survey. Lastly, section 10.5 concludes and discusses the limitations of the analysis as well as the potentially exaggerated role attributed to asymmetric information in shaping market outcomes in health care.

10.2 Types of Not-for-Profit Effects and Perfect Substitutability

In order to assess the existence of a not-for-profit premium, this section first describes the application of the standard potential outcome framework for the econometric analysis of the impact of not-for-profit status on firm behavior. Let (Y_0, Y_1) be two outcome vectors of a *single* firm, one occurring if that organization were to be a not-for-profit and the other if it were to be a for-profit. For example, the outcomes may represent input, output, or pricing behavior. The dummy D indicates organizational choice. If the organization chooses to be a not-for-profit firm, then we observe the outcome Y_0, and if it chooses to be a for-profit firm, we observe the outcome Y_1. For a given firm, then, we observe

$$Y = DY_1 + (1 - D)Y_0.$$

To discuss conversions over time, let Y denote such a pair of outcomes at a given time and Y' indicate outcomes at a later time. The central distribution of interest is then the joint distribution $F(y, y', d, d')$ over such pairs given the choices of organizational form over time.

As there have been many estimates of not-for-profit effects, it may be useful to make explicit the implicit identifying assumptions that link these effects and how they relate to the one of interest in detecting a not-for-profit premium. By definition of potential outcomes, we only observe the distributions $F(y_d|D = d)$ in the first period and $F(y_d'|D = d')$ in the second period. However, many effects in which we are interested involve knowing the counterfactual distributions $F(y_d|D \neq d)$ in the first period and $F(y_d'|D' \neq d')$ in the second. The missing data, by definition, is the behavior of the firms if they were not in their observed regulatory status. For example, we would not be able to observe the uncompensated care or debt level of a not-for-profit firm if the same firm was for-profit.

One may therefore distinguish between *observed* and *potential* effects of regulatory choice. Observed effects concern differences in behavior across firms in the regulatory status they have actually chosen, and potential effects concern differences between observed and counterfactual statuses. The first type of effect is key when testing positive theories of not-for-profit or for-profit choice as done in this paper; it focuses on how firms *do* behave in the data. The second type of effect focuses on how firms *would* behave under some other circumstances not observed in the data; it is therefore often key for evaluating new policy interventions, such as, for example, the effect of raised corporate income taxes on conversions.[5]

5. Observed versus potential effects have little to do with whether the analysis is cross-sectional across firms or longitudinal effects involving conversions of the same firm. Observable cross-sectional effects are concerned with comparing the outcomes of not-for-profits with for-profits, $F(y_0|d = 1)$ with $F(y_1|d = 1)$, as opposed to potential effects that require data, $F(y_1, y_0|d = 1)$ if looking at for-profits and $F(y_0, y_1|d = 1)$ when looking at not-for-profits. Likewise, observable longitudinal effects would compare $F(y_0|d = 0)$ with $F(y_1'|d' =$

Observed effects concern the properties of the equilibrium of firm behavior under regulations observed in the data. The observed effect of interest here concerns whether similar output in a mixed industry sells at a not-for-profit premium. A well-known argument in economics suggests that a necessary condition for two perfect substitutes to be sold in equilibrium is that they are priced equally. If they were not, consumers would not hold the more expensive substitute. Below, we will apply this simple argument to the case of the impact of organizational form in the mixed U.S. long-term care market. We operationalize this argument in a cross section of producers as follows. It implies that if one runs a price regression controlling for the observable aspects of the good affecting its value to the consumer, such as quality of services of homes, a not-for-profit dummy should have a zero effect. In other words, controlling for quality, price is not affected by organizational status.[6] Note that this is a *necessary* condition of equilibrium in the mixed long-term care market. It says that if we find two homes that offer the same services, as controlling for quality in a regression attempts to do, then they must be priced the same, independent of the status of the producer. It is not sufficient, since it may be that as an implication of this perfect substitutability, we only observe the lowest-cost organizational form. It is completely due to the demand side, as all it requires is that if two goods that are perfectly substitutable are to be held in equilibrium, they must be equally priced for demanders to hold them both.

It is well known that, generally, hedonic regressions do not identify demand schedules when both sides are heterogeneous; only when demand is homogeneous does the price function trace it out. However, here the argument is that although the demand side may be heterogeneous with respect to *other* quality attributes, under the null it is homogeneous with respect to organizational form; all consumers are perfectly willing to substitute the two given that the observable quality of the service is held constant. Consumers may value different types of services offered by nursing homes differently, although they all would be indifferent between a not-for-profit and for-profit home if they offered the same services. Although producers of different types may sort themselves due to differences in comparative advantages of care, when a not-for-profit firm and a for-profit firm end up providing the same service, they must do it at the same price because the hedonic equilibrium price function traces out the homogeneous indifference to organizational form.

1) when looking at not-for-profit conversions and $F(y_1|d = 1)$ with $F(y_0'|d' = 0)$ when looking at for-profit conversions. Potential longitudinal effects would concern how representative conversions were to changes in status of nonconverters.

6. Under perfect substitutability and equal prices, profit differences are only due to cost differences, which may be substantial given the difference in input markets between the two regulatory forms.

Lack of a not-for-profit premium is a cross-sectional independence restriction on outcome distributions across regulatory statuses. It says that price is independently distributed across regulatory status conditional on quality observable to consumers. Letting the outcome vector $Y = (p,q)$ discussed above represent price and quality, a weaker version of it only requires means, as opposed to the entire distributions, to be the same, as in

$$E[p_1|q_1 = q, d = 1] = E[p_0|q_0 = q, d = 0].$$

This cross-sectional observed effect does not claim to take a stand on what the potential effect is or what the longitudinal observed or potential effect is. In particular, longitudinal estimators that attempted to correct for "unobserved heterogeneity" would be particularly bad for addressing this equilibrium restriction.

The perfect substitutability implication differs from the not-for-profit premium implication due to asymmetry of information between demanders and suppliers. According to this argument, consumers are assumed to know the IRS status of the producer, but not to be able to know the full quality, both observed and unobserved, leading to an inequality replacing the equality above.

$$E[p_1|q_1 = q, d = 1] < E[p_0|q_0 = q, d = 0].$$

A priori, it seems that one would suspect that consumers knew more about the quality of output than the regulatory status of the firm. Nevertheless, a necessary equilibrium condition of a mixed industry would be that not-for-profits would then have to sell at a premium, since if they did not, output by for-profit firms would not be held.

10.3 Aggregate Trends in the U.S. Long-Term Care Industry

As background to the firm-level discussion of not-for-profit premia in the sale of long-term care to follow, this section first discusses the aggregate differences between the behavior of firms of different regulatory statuses.

Figure 10.1 shows the percentage trends in market structure and firm size during the last three decades. More precisely, it depicts the number of nursing homes, the average size of firms in terms of beds, and capacity in terms of occupancy rate.

According to these data, the total number of nursing homes in the United States increased during the mid-1970s, was fairly level during the late 1970s and early 1980s, and then decreased in the late 1980s and into the 1990s. However, the percentage differences in number of firms are rather small compared with the normalized value at year 1973. Occupancy rates have basically remained unchanged at very high levels, around 95 percent. However, the average firm size, beds per nursing home, has been

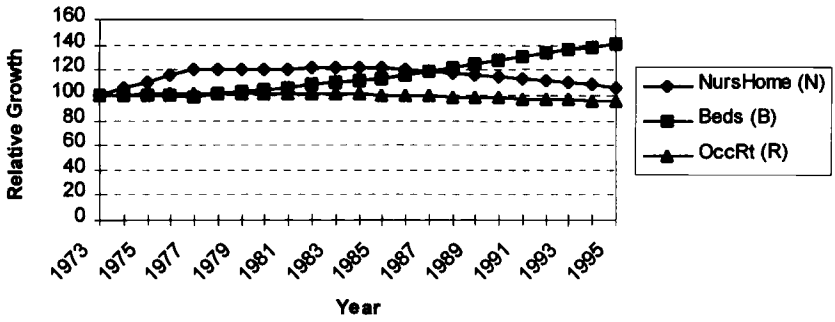

Fig. 10.1 Relative growth of number of nursing homes, beds per nursing home, and occupancy rates, 1973–95

Source: The data in this figure were constructed from several sources, including HCIA, the Health Care Financing Administration (HCFA), and annual censuses.

Note: The three trends above are all normalized to 100 in 1973. The actual values in 1973 are 16,700 for nursing homes, 75 for beds, and 91.4 percent for occupancy rates.

steadily increasing since 1973, with homes being about 40 percent larger now than in 1973. These three trends imply that output growth has mainly occurred through expanded firm size and not through expanded entry or capacity.

We first report aggregate state data on the observed premia and other differences between organizational forms. We use data from HCIA as reported for the years 1988–94 in the issues of the *Guide to the Nursing Home Industry.* This data set contains summary statistics for the universe of nursing homes in the United States that receive any reimbursement from Medicaid and Medicare, which is about 80 percent of the total universe of about 18,000 homes.

Table 10.1 shows the national evidence of the differences in output, input, and prices between for-profits versus not-for-profits as measured by the HCIA survey of homes.

The table reports both the absolute values as well as the relative values between the two groups. For example, it indicates that for-profits had, on average, 14 percent more beds in a home than not-for-profits in 1989. Consistent with other studies showing lower costs of for-profits relative to not-for-profits, the table reports lower staffing ratios and wages but a larger quantity of output as measured by patient days. For-profits use 87–91 percent of the full-time equivalents (FTEs) of not-for-profits, pay them 93 percent of not-for-profit wages, but take care of 11–13 percent more patient days. Since labor by far dominates the cost of production, on this high level of aggregation and not adjusting for quality and the type of patient populations for which these homes cared, for-profit homes are suggested to be lower cost. Despite these cost differences, and of relevance to our later analysis of pricing behavior, this aggregate data displays a *premium*

Table 10.1 **National Quantity and Price Data by Year and Type of Nursing Home, 1989–1994**

	1989			1990			1991			1992			1993			1994		
	FP	NFP	Ratio	FP	NFP	Ratio	FP	NFP	Ratio	FP	NFP	Ratio	FP	NFP	Ratio	FP	NFP	Ratio
Outputs																		
Patient days	34,565.5	30,754.9	1.12	34,518.05	31,355.32	1.1	34,423.15	31,325.76	1.1	34,995.95	31,063.25	1.13	34,818.99	31,040.77	1.12	34,306.35	30,453.04	1.13
Size (number of beds)	100	88	1.14	100	90	1.11	100	90	1.11	101	88	1.15	101	88	1.15	100	87	1.15
Capacity (occupancy rate)	94.7	95.75	.99	94.57	95.45	.99	94.31	95.36	.99	94.93	96.71	.98	94.45	96.64	.98	93.99	95.9	.98
Inputs																		
Labor																		
Full-time equivalents	.75	.86	.87	.76	.88	.86	.76	.88	.86	.8	.89	.9	.83	.91	.91	.84	.92	.91
Capital																		
Long-term debt to total assets	.57	.34	1.68	.6	.3	2	.6	.29	2.07	.54	.31	1.74	.51	.32	1.59	.56	.26	2.15
Age of plants	6.4	12.76	.5	7.07	12.97	.55	8.25	12.43	.66	8.28	13.42	.62	8.64	13.4	.64	8.96	14.07	.64
Depreciation	6.24	2.82	2.21	6.16	2.91	2.12	5.74	3.07	1.87	6.5	2.92	2.23	6.67	3.29	2.03	6.96	3.63	1.92
Prices																		
Outputs																		
Private price per day	35.72	31.35	1.14	41.50	35.51	1.17	35.53	25.64	1.39									
Public price per day	65.41	65.41	1	69.49	69.49	1	74.58	74.58	1									
% publicly priced days	69.55	67.18	1.04	71.49	69.04	1.04	73.06	71.82	1.02	72.81	71.54	1.02	72.20	71.27	1.01	71.66	70.14	1.02
Inputs																		
Wages	15,628	16,818	.93	17,321	18,626	.93	18,606	19,335	.96	20,133	20,615	.98	20,966	21,445	.98	21,801	22,162	.98

Source: National Nursing Home Survey, 1989–1994.

Note: FP represents for-profit, and NFP not-for-profit, nursing homes. Ratio indicates the for-profit divided by the not-for-profit values.

for for-profit care. At this level of aggregation, private prices are higher, not lower, for care in for-profit homes relative to not-for-profit homes.

Since the regulation and subsidization of this industry varies greatly across states, as Medicaid is administrated and partly funded by the states, it is useful to consider the aggregate state evidence regarding the differences between for-profit and not-for-profit care within states. Table 10.2 shows the aggregate state-level evidence on the differences between for-profits versus not-for-profits corresponding to the national evidence in table 10.1. Using a state as the unit of observation, it reports the distribution across states of the relative ratio of the measured variables. If this average is unity without any variance, then this means that, across all states, the two forms of organization have identical outcomes. The larger the variance and the further away this mean is from unity, the less alike the two forms are across states.

This unconditional data on the distribution of differences in averages across states shows that they are less pronounced than the national differences, so that part of the national differences is the result of aggregation bias with respect to heterogeneous states. Within a state, the two sectors appear to be more similar. For example, although for the nation as a whole, for-profits are about 14 percent larger in bed size, on average, they are 10 percent larger within a state. Although by definition, average public prices do not vary across organizational form within a state, the private prices are remarkably similar within states. This similarity does not of course control for any quality characteristics or other factors that may drive price, but it suggests that even on this broad level of aggregation, output tends to be priced similarly, as would be suggested by the perfect substitution hypotheses.[7]

10.4 Firm Level Analysis of the Not-for-Profit Premium

These aggregate data are only suggestive of the differences in behavior across firms of different organizational forms. In this section, we go on to consider the substitution hypothesis versus information hypothesis using firm-level data on prices from the two latest cross sections, 1985 and 1995, of the National Nursing Home Survey (NNHS). NNHS is a continuing series of national sample surveys of nursing homes, their residents, and their staff. Four nursing home surveys have been conducted: 1973, 1977, 1985, and 1995.[8] Although each of these surveys emphasized different top-

7. The observed effects were upper bounds on the counterfactual effects under the theory of choice of organizational form discussed in Lakdawalla and Philipson (1997). The ratio above therefore represents upper bounds of the differences given this level of aggregation; actual potential effects would be smaller than in the table under the theory.

8. These surveys were preceded by a series of surveys from 1963 through 1969 called the "resident places" surveys.

Table 10.2 **Distribution of State Differences in Aggregate Quantities and Prices by Year and Type of Nursing Home, 1989–1994**

	1989				1990				1991				1992				1993				1994			
	Mean	S.D.	Min.	Max.	Mean	S.D.	Min.	Max.	Mean	S.D.	Min.	Max.	Mean	S.D.	Min.	Max.	Mean	S.D.	Min.	Max.	Mean	S.D.	Min.	Max.
Output																								
Patient days	1.08	.29	.5	1.92	1.06	.26	.51	1.76	1.06	.25	.5	1.82	1.05	.28	.75	2.24	1.05	.27	.75	2.21	1.05	.27	.74	2.19
Size (number of beds)	1.1	.3	.53	1.9	1.09	.27	.53	1.84	1.08	.26	.53	1.84	1.07	.3	.76	2.42	1.06	.28	.76	2.3	1.06	.28	.75	2.3
Capacity (occupancy rate)	.98	.03	.91	1.03	.98	.03	.91	1.01	.98	.03	.91	1.03	.98	.02	.93	1.04	.99	.02	.94	1.04	.99	.03	.94	1.04
Inputs																								
Labor																								
Full-time equivalents	.85	.09	.61	1.04	.87	.1	.64	1.06	.86	.11	.56	1.08	.9	.08	.72	1.04	.91	.08	.73	1.06	.92	.07	.75	1.03
Capital																								
Long-term debt to total assets	1.49	.92	.05	4	1.54	.98	.25	4.1	1.55	1.2	.13	5.57	1.46	.6	.55	3.25	1.47	.81	.46	4.4	1.33	.53	.28	2.68
Age of plants	.6	.23	.19	1.14	.66	.22	.26	1.19	.72	.25	.28	1.24	.76	.19	.35	1.18	.77	.16	.4	1.09	.77	.15	.54	1.07
Depreciation	1.56	.55	.69	3.39	1.47	.59	.15	3.32	1.44	.45	.65	2.5	1.37	.34	.81	2.21	1.33	.36	.89	2.26	1.22	.29	.77	2
Prices																								
Outputs																								
Private price per day	.97	.24	.33	1.37	1	.69	.13	4.62	.88	.28	.16	1.28	.96	.23	.35	1.45	1.04	.2	.61	1.41				
Public price per day	1	0	1	1	1	0	1	1	1	0	1	1	1	0	1	1	1	0	1	1				
% publicly priced days	1.13	.18	.9	1.58	1.16	.2	.94	1.84	1.15	.16	.93	1.54	1.12	.14	.97	1.56	1.11	.12	.98	1.53	1.09	.1	.98	1.47
Inputs																								
Wages	.97	.09	.73	1.38	.97	.09	.69	1.17	.99	.12	.73	1.52	1	.05	.9	1.1	.99	.04	.89	1.1	.99	.03	.9	1.05

Source: National Nursing Home Survey, 1989–1994.

Note: Summary statistics refer to the for-profit divided by the not-for-profit variable values.

ics, they all provided some common basic information about nursing homes, their residents, and their staff. For our purposes in investigating pricing, we only utilize the 1985 and 1995 cross sections because those were the only ones that contained prices. The survey is that of repeated cross sections and thus does not allow for longitudinal comparison. However, the pricing implication of interest concerns the observed cross-sectional equilibrium distribution at a particular point in time. It asks whether, at a given time, similar outputs sell at different or the same prices dependent on organizational status. Therefore, it does not put clear restrictions on the longitudinal data in terms of changes in prices over several periods. Therefore, the fact that NNHS is not a panel survey is not of primary importance for the question addressed here.

The frame of the NNHS includes all nursing and related care homes in the United States. Places that only provide room and board are excluded, as are places with fewer than three beds. All nursing home facilities included in the survey are freestanding or are nursing care units of hospitals, retirement centers, or similar institutions where the unit maintains financial and resident records separate from those of the larger institution. The two earlier surveys, conducted in 1985 and in 1977, are similar because they both included nursing care homes, personal care homes, and domiciliary care homes. These surveys represent a broadening in scope over that of the 1973–74 survey, which excluded facilities providing only personal care or domiciliary care. However, because personal and domiciliary care homes constitute such a small proportion of the 1977 and 1985 surveys, no special adjustments need to be made when comparing the three surveys.

The data were sampled using a stratified two-stage probability design. The first stage was a selection of facilities, and the second stage was a selection of residents and employees of the sampled facilities. In the 1985 survey, only registered nurses were sampled. The sampling frame for employees was the list of all staff members, including those employed by contract. Only staff members involved in direct patient care (administrative, medical, therapeutic, and nursing staff) were sampled. Survey data were collected using a combination of personal interview and self-enumerated forms.

The summary statistics of the data for the two cross sections 1985 and 1995 of the NNHS are contained in tables 10.3 and 10.4. As before, for each year, the data are reported by the tax status of the home.

Similar to the aggregate data discussed before, these summary statistics are grouped into categories of output and input, along with their corresponding prices. The variable that divides up the data in each cross section is a for-profit dummy that indicates the tax status of the home. Due to the different designs of the survey, the 1985 categorization of not-for-profit includes only private firms but the 1995 categorization contains both public and private firms. The 1985 data are generally better suited than the 1995 data for investigating our question concerning price differences

Table 10.3 Summary Statistics of Nursing Homes by Ownership Status, NNHS 1985

	For-Profit (N = 752)[a]		Not-for-Profit (N = 336)	
	Mean	SD	Mean	SD
Control variables				
Hospital-owned home[b]	0.002	0.05	0.07	0.25
Member of group of homes[b]	0.62	0.48	0.34	0.47
Output variables				
Quantity-patient days	42,404	23,516	52,249	30,827
Percent days subsidized				
Medicaid skilled	0.22	0.29	0.23	0.3
Medicaid intermediate	0.42	0.35	0.37	0.33
Medicare	0.02	0.07	0.03	0.11
Scale—number of beds	121	60	131	70
Admissions	118	102	108	123
Discharges	110	100	94	118
Output prices				
Private price per day				
Skilled	64	15	70	18
Intermediate	53	12	55	14
Residential	43	17	40	16
Public Medicaid price per day				
Skilled	50	11	58	14
Intermediate	42	8	45	10
Quality variables				
Medicaid certified				
Skilled[b]	0.68	0.47	0.72	0.45
Intermediate[b]	0.86	0.35	0.8	0.4
Percent of measured resident services provided[c]	0.70	0.14	0.72	0.13
Location				
City[b]	0.69	0.46	0.67	0.47
Northeast region of U.S.[b]	0.19	0.39	0.29	0.46
North central region of U.S.	0.30	0.46	0.43	0.49
South region of U.S.[b]	0.36	0.48	0.18	0.39
West region of U.S.[b]	0.15	0.37	0.1	0.3
Input variables				
Number of MDs				
Full time	0.08	0.79	0.59	3.05
Part time	0.34	1.56	1.10	3.03
Number of nurses				
Full time	4.60	5.24	10.48	14.44
Part time	3.15	4.16	6.13	6.79
Number of nurses' aides				
Full time	33.75	25.75	50.84	47.77
Part time	11.35	12.78	18.75	20.09

[a]Note that missing observations will decrease the sample size for certain variables summarized below.

[b]Variable is a dummy, with Yes = 1 and No = 0.

[c]This is a quality index that represents the fraction of 18 measured services the nursing homes provide. These measured services are medical, other medical, nursing, mental health, physical therapy, speech or hearing therapy, occupational therapy, special education, personal care, social services, nutrition, hospice, sheltered employment, vocational rehabilitation, transportation, prescription/non-prescription medications, equipment/devices, and any other resident services. Note that specifying these services as separate dummy variables did not significantly alter the findings.

Table 10.4 **Summary Statistics of Nursing Homes for 1995 National Nursing Home Survey by Ownership Status, NNHS 1995**

	For-Profit (N = 924)[a]		Not-for-Profit (N = 485)	
	Mean	SD	Mean	SD
Control variables				
Member of group of homes[b]	0.66	0.47	0.34	0.47
Output variables				
Scale—number of beds	122	52	108	59
Admissions	137	152	134	169
Output prices				
Private price per day				
Skilled	124	69	137	61
Intermediate	98	29	102	35
Residential	80	30	81	45
Public Medicaid price per day	88	72	105	98
Public Medicare price per day	181	76	165	68
Quality variables				
Certified[b]	0.98	0.16	0.94	0.23
Percent of measured resident services provided[c]	0.76	0.11	0.75	0.11
Located in city[b]	0.69	0.46	0.69	0.46
Input variables[d]				
FTEs: Administrators	1.41	0.99	1.7	1.51
FTEs: Registered nurses	8.77	8.52	15.52	18.27
FTEs: Licensed practicing nurses	13.53	10.48	19.21	24.95
FTEs: Nurses' aides	43.12	28.39	64.31	59.94
FTEs: Doctors	0.45	1.62	1.03	4.48
FTEs: Dentists	0.1	0.33	0.13	0.4
FTEs: Dental hygienists	0.05	0.38	0.06	0.25
FTEs: Physical therapists	1.16	2.31	1.02	2.11
FTEs: Speech	0.56	0.92	0.41	0.98
FTEs: Dietitians	0.98	1.76	1.18	1.54
FTEs: Podiatrists	0.14	0.4	0.15	0.47
FTEs: Social workers	1.47	1.36	2.25	2.08

[a]Note that missing observations will decrease the sample size for certain variables summarized below.

[b]Variable is a dummy, with Yes = 1 and No = 0.

[c]This is a quality index that represents the fraction of 20 measured resident services the nursing homes provide. These measured services are dental, help with oral hygiene, home health, hospice, medical, mental health, nursing, nutrition, occupational therapy, personal care, physical therapy, podiatry, prescription/non-prescription medications, sheltered employment, social services, special education, speech or hearing therapy, transportation, vocational rehabilitation, and equipment/devices. Note that specifying these services as separate dummy variables did not significantly alter the findings.

[d]An FTE is a full-time equivalent employee.

across similar services; they contain more detailed categorization of prices as well as better controls on the cost of production in the homes.

There are three levels of service provided by a nursing home in these data, and both private and public pricing differentiates between them. These three levels are skilled, intermediary, and residential, ranging from the most to the least acute care offered, and hence from the most expensive to the least expensive. In 1995, the market is divided roughly in half between skilled and intermediate care, 46 versus 50 percent of consumers, with residential care making up the remaining 4 percent.[9] Although the type of services differs across these three levels of care, in the 1995 NHHS, the fraction of residents within an average home using particular services were as follows: 17 percent for dental care, 88 percent for medical services, 14 percent for mental health services, 96 percent for nursing services, 69 percent for nutritional services, 14 percent for occupational therapy, 25 percent for physical therapy, 93 percent for prescribed and nonprescribed medication, 64 percent for social services, 7 percent for speech and hearing therapy, 22 percent for transportation services, and 8 percent for other types of services not documented.

There is a large share of consumers that are publicly subsidized by the Medicaid program for the poor and the Medicare program for the old. Medicare subsidies are not means tested and are only for about three months of more acute skilled nursing care after hospitalization; this represents a very small fraction of total days, in terms of a few percent. Medicaid subsidies are means tested but are for both skilled and intermediary care; this represents a very large fraction of total days—often more than two-thirds. Furthermore, states differ substantially in how they spend and regulate the nursing home industry through Medicaid. The main impact of this is through the daily price they pay for subsidized consumers—the per diem prices of skilled or intermediary Medicaid patients.

Since prices reflect the cost of production of the quality of care provided, it is important to control for quality when assessing price differences across organizational form for similar services. The two waves of the NNHS contained rather detailed measures of quality, both in terms of the type of labor employed (accounting for about 90 percent of overall production costs) as well as the services provided to consumers in the home. About 20 different types of services were measured in both years, and we created an index representing the fraction of these measured services that were provided within a home.

Tables 10.5 and 10.6 consider cross-sectional price differences for similar outputs for the years 1985 and 1995. The equilibrium effect of organizational form is estimated controlling for service offered in terms of the type of consumer population served, labor inputs, size and quality of insti-

9. See National Center for Health Statistics (1997).

Table 10.5 **Perfect Substitution Tests, NNHS 1985**

	Public Price (1)	Output, Control (2)	Input (3)	Quality (4)
	Dependent Variable: Private Price Per Day—Skilled			
For-profit	0.03	0.05	0.07	0.06
	(1.73)	(2.19)	(3.10)	(3.13)
Sample size	487	413	413	413
R^2	0.53	0.54	0.58	0.62
	Dependent Variable: Private Price Per Day—Intermediate			
For-profit	.05	.05	.07	.07
	(1.73)	(2.42)	3.50)	(3.58)
Sample size	478	405	405	405
R^2	0.43	0.49	0.53	0.60
	Dependent Variable: Private Price Per Day—Residential			
For-profit	0.26	0.20	0.26	0.27
	(4.64)	(2.73)	(3.46)	(3.58)
Sample size	154	132	132	132
R^2	0.19	0.32	0.38	0.42

Note: The specifications (1–4) correspond to the blocks of variables found in the summary statistics in table 10.3. Each subsequent specification includes all those variables included in the previous specifications (e.g., specification 2 includes both the output/control variables and public prices). Coefficient estimates of the for-profit variable (1 = for-profit, 0 = not-for-profit) are reported with *t*-statistics in parentheses below them. All price variables (both public and private) are logged in these regressions.

tution, as well as other variables that may determine the value of the product to consumers. The tables report four specifications with successively larger and inclusive conditioning sets. These conditioning sets correspond to the sets reported in the summary statistics in tables 10.3 and 10.4.

The key effect of interest for the perfect substitution or asymmetric information hypothesis is that of the for-profit dummy that indicates how price changes with the tax status, controlling for quality of care. Only these price effects of organizational form are reported across the four specifications.[10] This effect concerns the observed effect of the equilibrium distribution of homes choosing their actual status; it has little to say about the potential effects when the equilibrium would change under alternative incentives than those prevailing when the data was collected.

The two years display somewhat different results regarding the premia for for-profit care. Overall, 1985 provides more support to the argument that for-profit care sells at about a 5 percent premium, as opposed to 1995, which indicates support for the perfect substitutability implication of no premium in either direction. The results also differ across the types of care

10. The entire tables are available from the author upon request.

Table 10.6 **Perfect Substitution Tests, NNHS 1995**

	Public Price (1)	Output, Control (2)	Input (3)	Quality (4)
	Dependent Variable: Private Price Per Day—Skilled			
For-profit	−0.02	0.01	0.04	0.17
	(−0.70)	(2.562)	(1.8)	(2.06)
Sample size	912	834	821	821
R^2	0.40	0.40	0.43	0.45
	Dependent Variable: Private Price Per Day—Intermediate			
For-profit	−0.004	0.008	0.03	0.04
	(−0.18)	(0.37)	(1.14)	(1.56)
Sample size	623	568	557	557
R^2	0.40	0.43	0.46	0.48
	Dependent Variable: Private Price Per Day—Residential			
For-profit	0.16	0.14	0.17	0.02
	(2.32)	(1.80)	(2.06)	(0.80)
Sample size	217	198	195	195
R^2	0.13	0.17	0.23	0.27

Note: The specifications (1–4) correspond to the blocks of variables found in the summary statistics in table 10.4. Each subsequent specification includes all those variables included in the previous specifications (e.g., specification 2 includes both the output/control variables and public prices). Coefficient estimates of the for-profit variable (1 = for-profit, 0 = not-for-profit) are reported with *t*-statistics in parentheses below them. All price variables (both public and private) are logged in these regressions.

offered. In particular, for residential care, the premia for for-profit care are the largest and the most significant. The asymmetric information argument would seem to imply that not-for-profit output should sell at a premium relative to for-profit output when they are both demanded in a competitive economy. However, for neither year and neither type of the three types of care offered does the premium for for-profit care become significantly negative.

These results have several obvious limitations and should therefore be viewed as suggestive, and not conclusive, in demonstrating the empirical relevance of perfect substitutability of organizational form. The first limitation is the lack of quality controls available in the data, particularly in terms of not being able to assign geographical locators of homes in great detail. Second, it is well known that there are barriers to entry in U.S. health care markets, particularly in long-term care, where certificate of need (CON) laws seem to have had a great impact and are often monitored and enforced with respect to measures such as beds per old individual in the region.[11] Noncompetitive markets may have less substitution than assumed throughout the discussion here, as public regulations may inflate

11. See Lakdawalla and Philipson (1997) who uses the differences in the restrictiveness in CON laws to explain not-for-profit shares across states.

for-profit premia. Without such regulatory barriers that may allow for-profits to mark up more aggressively, both perfect substitutability or information asymmetry would imply that if for-profits mark up more, then full substitution toward the equally or more preferred output of not-for-profits should take place in the long run.

To address these concerns to the largest degree feasibly allowed by these data, although not by any means ideally, table 10.7 reports the estimated premia by region and interacts them with city versus rural location within those regions. The table indicates that the premia are of similar order, although efficiency is reduced and the coefficients are freed up to vary across regions.

Many observers of health care and other regionally based markets tend to believe that regional market power is less pronounced in city markets; that is, city markets are more competitive than rural markets. Therefore, if competition lowers the for-profit premium because market power is less pronounced, one would expect the for-profit premium to be lower in the city markets than in rural markets. However, the city interaction in column 5 of table 10.7 seems to indicate that the for-profit premium is *higher* in the more competitive city markets, especially in intermediary care. The raw or unconditional interaction, the second specification within each region, has a negative but most often insignificant effect. However, when controlling for quality as done before, the interaction is either insignificantly different from zero or significantly positive. At this level of aggregation, this raises questions about whether less-restrictive entry barriers would eliminate the for-profit premium.

10.5 Concluding Discussion

A necessary condition of equilibrium with mixed production under the asymmetric information rationale for not-for-profit production is that their output sells at a premium. However, we found that data from the National Nursing Home Survey in 1995 seem to support perfect substitutability and that data from 1985 even indicate the existence of a *for-profit* premium. The empirical analysis here was naturally tentative and illustrative. In addition, the U.S. long-term care industry has potential barriers to entry in some states, making the free entry assumption required for price equalization difficult. However, we hope the main message of the exercise is clear: Theoretical arguments about not-for-profit production, in particular the role of asymmetric information, need to be confronted with supporting data before acquiring their current level of acceptance.

More generally, it may be that asymmetric information plays a less important role in determining outcomes in health care markets than is often argued by economists (see Arrow 1963). Indeed, for mortality-inducing or chronic health conditions, it is difficult to think of any other goods or service markets in which consumers know *more* about available alterna-

Table 10.7 **Perfect Substitution Tests within Regions, NNHS 1985**

	Public Price (1)	Output, Control (2)	Input (3)	Quality (4)	Within-City Effects (5)
			Dependent Variable: Private Price Per Day—Skilled		
Northeast Region					
For-profit	.068 (2.58)	.071 (2.02)	.060 (1.57)	.061 (1.59)	.091 (1.058)
For-profit*City	—	—	—	—	−.036 (−.394)
Sample size	117	93	93	93	93
R^2	.53	.63	.64	.66	.66
North Central Region					
For-profit	.025 (.987)	.058 (1.842)	.078 (2.418)	.073 (2.244)	.016 (.358)
For-profit*City	—	—	—	—	.096 (1.759)
Sample size	194	160	160	160	160
R^2	.31	.44	.50	.50	.51
South Region					
For-profit	.006 (.168)	−.050 (−1.041)	−.040 (−.791)	−.031 (−.615)	−.003 (−.024)
For-profit*City	—	—	—	—	−.035 (−.270)
Sample size	128	116	116	116	116
R^2	.50	.59	.61	.63	.63
West Region					
For-profit	.041 (.753)	.029 (.310)	−.003 (−.033)	.008 (.076)	.652 (3.135)
For-profit*City	—	—	—	—	−.784 (−3.392)
Sample size	48	44	44	44	44
R^2	.09	.27	.46	.47	.65

	Dependent Variable: Private Price Per Day—Intermediate				
Northeast Region					
For-profit	.092 (3.59)	.096 (2.80)	.110 (2.986)	.109 (2.922)	.208 (2.505)
For-profit*City	—	—	—	—	−.117 (−1.332)
Sample size	115	91	91	91	91
R^2	.26	.31	.44	.46	.47
North Central Region					
For-profit	.033 (1.317)	.038 (1.246)	.054 (1.770)	.046 (1.497)	.052 (1.175)
For-profit*City	—	—	—	—	−.010 (−.192)
Sample size	194	161	161	161	161
R^2	.26	.40	.48	.50	.50
South Region					
For-profit	.051 (1.369)	.001 (.010)	.011 (.221)	.029 (.612)	.059 (.580)
For-profit*City	—	—	—	—	−.039 (−.334)
Sample size	123	111	111	111	111
R^2	.46	.59	.62	.67	.67
West Region					
For-profit	.059 (1.194)	.035 (.438)	−.006 (−.071)	−.010 (−.110)	.437 (2.210)
For-profit*City	—	—	—	—	−.546 (−2.483)
Sample size	46	42	42	42	42
R^2	.04	.32	.51	.51	.62

Note: The specifications (1–4) correspond to the blocks of variables found in table 10.3 (with the exception that the region dummies in specification 4 have been omitted). Each subsequent specification includes all those variables included in the previous specifications (e.g., specification 2 includes both the output/control variables and public prices). Specification 5 is identical to specification 4 except that it includes an interaction term (FP*City). Coefficient estimates of the for-profit variable (1 = for-profit, 0 = not-for-profit) are reported with *t*-statistics in parentheses below them. All price variables (both public and private) are logged in these regressions.

tives. Chronic illness allows time to learn and, as a consequence, the level of information among chronically ill about available treatments is astounding. It is not uncommon that it is at least on par with that of doctors not specializing in the disease. The growth in disease-specific web pages and electronic support groups will only spur this knowledge. Although foreign to the working assumptions of economists analyzing health care markets, this is not surprising, since when decisions are important, people will inform themselves about their consequences. In the face of these strong incentives for acquiring information by the demand side, tracing out the empirical content of the proposed impacts of asymmetric information in health care markets seems important, particularly since the conviction of economists of their importance often is based on theoretical citations rather than on the facts those citations help explain.[12]

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12. For an elaboration of this argument, see Cawley and Philipson (forthcoming).

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Comment on Chapters 9 and 10

Judith K. Hellerstein

Introduction

The two papers I discuss here, "The Tax Benefits of Not-for-Profit Hospitals" by Gentry and Penrod (hereafter GP), and "Asymmetric Information and the Not-for-Profit Sector: Does Its Output Sell at a Premium?" by Philipson, seem at first glance to have little in common other than that they both examine aspects of organizational form (for-profit versus not-for-profit) within health care. Upon closer inspection, however, there are many interesting features of the papers that are similar, from their attention to detail in discussing the institutions they study to the similar implications that can be drawn from both papers about the effects of organizational form in health care, implications that are not the focus of either paper.

The remainder of my discussion will consist of four sections. In the next section, I discuss how the two seemingly disparate papers are actually similar in many ways, and how together they bring to light some important implications about organizational form in health care. In the third section, I comment briefly on GP alone, while in the fourth section I comment briefly on Philipson. The fifth section concludes.

Linking the Papers

While both the GP and Philipson papers consider aspects of organizational form in health care markets, they seek to answer completely differ-

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ent questions in very different markets within health care. GP examines the implications of the tax benefits of not-for-profit hospitals in the United States, and provides ceteris paribus benchmark estimates of the dollar value of the benefits to not-for-profit hospitals of the various aspects of their tax exemption. Philipson, on the other hand, examines empirically whether consumers are willing to pay a premium for not-for-profit care in nursing homes, which is what agency theories of the benefits of not-for-profits suggest.

Moreover, even though both papers are concerned with aspects of organizational form (for-profit versus not-for-profit) in health care, the markets they examine are different. Nursing homes can be thought of as providing long-term health care for the elderly, and short-term general hospitals (those considered by GP) can be thought of as providing short-term health care for the general population. Importantly, as Philipson notes, there is a fundamental difference between them in the United States: Hospitals are primarily not-for-profit, while in nursing homes, the for-profit organization predominates.

One might expect, then, that the two papers would have little in common. And yet there are striking similarities between them. The first similarity is stylistic, but it bears mentioning because it is quite important. The two sets of authors both pay careful attention to the important details of the institutions they study. GP, in considering the magnitudes and implications of the tax benefits of not-for-profit hospitals, explain clearly the tax implications of not-for-profit status. They also document in great detail similarities and differences in the structures of not-for-profit versus for-profit hospitals, including tabulations across organizational forms of inputs and outputs (facility beds, employees, length of stay, assets, patient composition, available technologies, etc.) and financial information, including measures of profitability. Philipson, in focusing on long-term health care facilities, also documents in detail differences across organizational form in inputs and outputs such as facility beds, types of employees, and types of services offered. Both papers therefore serve useful purposes as references for readers interested in learning more about the economics of organizational form in short-term and long-term care in the United States, and may help inspire future research about these markets.

GP identify the three common justifications for the existence of not-for-profits. Perhaps the most compelling justification, at least from an economic standpoint, is that there are information asymmetries in the provision of health care. Since consumers of health care cannot fully evaluate the quality of the services they are purchasing, for-profits will have an incentive to both underprovide quality and overprovide quantity, as both of these can increase profits. The existence of not-for-profits, then, helps solve this agency problem. It is this justification for not-for-profits that forms the basis for the Philipson paper. If consumers cannot, in fact, fully

evaluate the quality of health care they are receiving, they should be willing, in theory, to pay for the elimination of this agency problem. In other words, consumers should be willing to pay a premium for the services of a not-for-profit provider, and Philipson provides an empirical test of this hypothesis in nursing homes.

While not-for-profits do enjoy tax benefits because of their organizational form, GP point out that they may be disadvantaged in two ways. First, they may have a harder time accessing capital than for-profits because they cannot issue equity, and second, they may not enjoy the managerial efficiency that for-profits enjoy because of principal-agent problems. In fact, both papers provide evidence that is at least consistent with both of these issues.

GP provide ample evidence that for various sensible measures of capital intensity (or its inverse), for-profit hospitals are more capital intensive than not-for-profit hospitals. This is shown most convincingly in the descriptive multivariate regression results in table 9.5, where for-profits have significantly lower employee-to-bed ratios in addition to significantly higher ratios of fixed assets to net patient revenues, fixed assets per discharge, and capital costs over total costs. Philipson only provides summary statistics of characteristics of not-for-profit and for-profit nursing homes and provides no statistical tests for differences between the two, so it is slightly harder to tell whether capital intensity really varies statistically across organizational form. Nonetheless, from the statistics he does present in table 10.1, which are derived from national data for 1989–1994, for-profits have higher bed sizes but fewer employees, so that the employee-to-bed-size ratio is smaller in for-profit than not-for-profit nursing homes. In addition, for-profits also pay lower wages and therefore have much higher labor costs per bed size.

What is most striking across the two papers, however, is the consistent results on differences in profitability across organizational form in hospitals and nursing homes. GP find that for-profits have statistically significant higher net income, return on assets, return on fixed assets, and operating margins than not-for-profits. Philipson, meanwhile, finds in regressions of price on measures of what might be termed quality plus an organizational form dummy, that prices charged by for-profits are at least as high as, if not higher than, those charged by not-for-profits. Moreover, this is true even though for-profits have lower labor costs, something that is also true in GP's hospital results. Since, as Philipson notes, labor costs are by far the biggest cost of production in nursing homes, these results imply that for-profit nursing homes are more profitable than not-for-profit nursing homes.

These profitability results are at least consistent with the hypothesis that for-profits in health care are able to take advantage of managerial efficiency to increase profits. Further research is needed to confirm the results

of these papers (particularly using data from other years) and to study explicitly whether managerial efficiency is the reason behind the profitability of for-profit hospitals and nursing homes. Moreover, further research into the mechanisms by which for-profits achieve this profitability should be a priority.

Both papers do provide evidence that should be taken as a starting point for further research. It appears that for-profits are able to achieve higher profitability by adjusting both along the output price and input cost margins in ways that go beyond keeping labor costs down. GP provide evidence that for-profit hospitals have consistently lower lengths of stay for all types of patients (which leads to lower input costs), yet they report that their case-mix index is higher than not-for-profits. The lower length of stay result suggests that for-profit hospitals are successful in reducing input costs per patient, while the case-mix result may imply that for-profits are better able to "game" the insurance reimbursement system,[1] which can be thought of as a way of adjusting along the output price margin. Philipson's results, if taken at face value, show that for-profit nursing homes are able to adjust prices directly, charging more in many cases to private patients than not-for-profits.[2] One has to wonder what the implications of these results are for patient welfare in particular, and social welfare in general.

The Behavioral Response Problem in Computing Tax Benefits of Not-for-Profit Status

GP should be applauded for their attention to detail in considering the many facets of the tax status of not-for-profit versus for-profit hospitals, and in attempting to carefully estimate the dollar magnitude of the tax benefits of not-for-profit status. This was no small task. As GP note, however, almost all of their estimates are based on the assumption that there would be no behavioral responses to the elimination of the tax benefits for not-for-profit hospitals. The authors do consider many possible ways in which not-for-profit hospitals might respond to losing their tax-exempt status, and conclude the paper by suggesting that the trend toward hospital conversions to for-profit status may provide evidence on the magnitudes of behavioral responses. This seems overly optimistic, unfortunately, for two reasons.

First, there is ample evidence that for-profits make strategic decisions about where to locate (e.g., Norton and Staiger 1994). This should be the case if indeed they are acting as profit maximizers, and hospital conversions should occur for strategic reasons as well. If hospital conversions occur nonrandomly, trying to infer behavioral responses of comprehensive

1. For evidence of how and why this might happen, see McClellan (1997).

2. How for-profit nursing homes are able to do this is not clear, and I return to this point below.

tax reform from longitudinal changes in the behavior of converted hospitals may be very misleading. If one cannot control for all of the factors that lead a hospital to convert, one will not get an accurate picture of behavioral responses to tax-exemption status.

Second, the behavioral response of hospitals to a global change in tax policy may be very different from the behavioral response of a given not-for-profit hospital when it converts to for-profit status. A change in tax policy would affect every not-for-profit hospital in a given market (albeit not uniformly, obviously), while a change in the tax status of one hospital via conversion affects other hospitals only indirectly through market competition. There is no reason to believe that the behavioral responses of hospitals to these two very different changes to the structure of market competition will be comparable.

In the end, then, one is confronted with the fact that actually estimating the behavioral responses to changes in the tax exemption status of hospitals is a formidable task. Given the complexity involved in modeling the market structure of hospitals, it may well be that estimating such a behavioral response will require some sort of fortuitous "natural experiment"-type policy change.

Do For-Profit Nursing Homes Really Charge Higher Prices?

Philipson provides evidence from hedonic regressions that the agency justification for not-for-profit status does not hold up empirically in his data. Indeed, for many specifications, for-profit nursing homes actually charge statistically significant higher prices than not-for-profits, even conditional on the other observable characteristics of nursing homes in his data. The economic differences in prices are also substantial: The estimates range from a 6 percent price premium to a 27 percent price premium in 1985, although the estimates are smaller and not always significant in 1995.

One is left to wonder, then, how it is that for-profit nursing homes are able to charge a premium over not-for-profits. One possibility is simply that this is an artifact of the data. In particular, the quality measures that the National Nursing Home Survey contains are somewhat crude as they measure formal services provided by the nursing homes. Indeed, adding the quality variables into the regression does not change the R^2's much, so these quality variables (the coefficients of which are not reported) do not explain much of the variation in nursing home prices. It may well be that consumers (either nursing home patients or their families) also value highly many less formal services provided by the nursing homes, services that are harder to measure in a survey filled out by nursing home administrators but that may well be correlated with the organizational status of the nursing home. In particular, a for-profit nursing home will specialize in providing some aspects of these unmeasured quality variables if doing

so allows it to provide a differentiated "product" for which consumers are willing to pay a premium and for which profits are increased.

Another possibility for the finding that for-profit nursing home prices are higher is that consumers do not have full information about price and quality when choosing a nursing home for themselves or a family member. Given the circumstances under which such choices are made, this may well be the case. This is, of course, exactly the type of agency problem that is used to justify the existence of not-for-profits, because while not-for-profit nursing homes may not have an incentive to exploit this information asymmetry, for-profit nursing homes will want to take advantage of consumers' lack of information. While Philipson argues that this problem should lead consumers to use not-for-profit organizational form as a signal of the nonexploitation of consumers, there may be other signals that consumers infer from organizational form (such as managerial efficiency or interest in complying with the demands of longer-term residents).

The data set used in this paper will not be enough to get to the bottom of the puzzle of why or whether for-profits are able to charge a premium for long-term care. Patient satisfaction surveys, more attention to the process by which nursing homes are chosen, and more detailed surveys of the services (formal and informal) provided by nursing homes are needed, all in combination with good price data.

Conclusion

Both the paper by GP and the paper by Philipson provide food for thought about a variety of topics. While the papers set out to examine very different aspects of not-for-profit health care and look at different types of care (short-term hospitals versus long-term nursing homes) for different populations, they find consistent patterns along a number of dimensions. The most interesting of these is the finding that for-profits are consistently more profitable than not-for-profits. Assuming this empirical result holds up upon further examination, it has the potential to have large implications for patient and consumer welfare, implications that should be considered in future research. This is particularly important as these markets rapidly evolve in response to changes in the structure of health insurance, changes in federal and local policy toward the provision of health care, and the aging of the population.

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Comment on Chapter 10

William B. Vogt

In his chapter, "Asymmetric Information and the Not-for-Profit Sector: Does Its Output Sell at a Premium?" Tom Philipson estimates a hedonic price function in order to assess the degree to which not-for-profit (NFP) nursing homes provide higher quality care than do for-profit (FP) nursing homes.[1] He motivates this empirical project by noticing that the substantial representation of not-for-profit firms in the production of health services is normally explained by recourse to (often implicit) agency models. The idea is that not-for-profits have different objectives than do their for-profit counterparts. Perhaps they value not only profit but also the delivery of high-quality goods. These preferences may cause them to deliver high-quality goods in circumstances where for-profit firms would choose to deliver low-quality goods. Not-for-profits do not cheat on (unobserved) quality because they do not want to cheat.

The paper reasons that, if not-for-profits do, indeed, deliver higher quality care than do for-profits, then consumers, recognizing this, will be willing to pay higher prices for the not-for-profits' services. This greater willingness to pay should show up in data as a higher selling price for not-for-profits' services.

The paper's empirical implementation consists of a hedonic price regression performed on data for a sample of nursing homes in the United States in the years 1985 and 1995. Price is regressed on a large array of observable characteristics, including prices paid by public payers, scale, input use, and quality indicators. The results indicate that, unconditionally, not-for-profits receive higher prices than do for-profits. However, when the array of control variables is entered into the regression, this result either disappears or reverses itself. The paper concludes that, in 1995, there was no difference in willingness to pay, and in 1985, there appears to be higher willingness to pay for for-profit firms.

This paper represents an interesting attack on a problem that has seen too little serious empirical investigation. The question it addresses is provocative and timely, the methodology employed is thought provoking, and the results of the analysis are fascinating. In my comments, I would like, first, to examine in a little more detail the assumptions undergirding the analysis, and, second, to suggest that the results admit alternative explanations.

Although the paper does mention many of the assumptions that lie behind this type of exercise, I think it is worth emphasizing again what assumptions ensure that a regression of this kind produces results interpret-

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1. I confine my comments to this paper because my knowledge of public finance is limited enough that my comments on Gentry and Penrod would not likely be useful.

able as willingness-to-pay measures. For the sake of explicitness, let us examine a utility function for long-term care (LTC) services. Suppose consumers make a discrete decision about the firm at which to consume LTC and that, after this, the utility of the choice is revealed to them:

$$U_{ij}(X_{1j}, X_{2j}, X_{3j}, \text{NFP}_j, I - p_j) = \beta'_{i1}X_{1j} + \beta'_{i2}X_{2j} + \beta'_{i3}X_{3j} + \beta_{i\text{NFP}}\text{NFP}_j + \alpha(I - p_j).$$

Here U_{ij} is the utility to consumer i of going to firm j; X_{1j} are the characteristics of firm j observable to consumers and the econometrician; X_{2j} are the characteristics of firm j observable to consumers but not the econometrician; X_{3j} are the characteristics of firm j observable to neither; NFP is an indicator variable for NFP status; p_j is firm j's price, I_i is consumer i's income, and β_i represent the weights assigned to various characteristics by consumer i. Since consumers cannot see X_{3j}, they form expectations over them, so that their behavioral utility function will be:

$$U_{ij}(X_{1j}, X_{2j}, \text{NFP}_j, I - p_j) = \beta'_{i1}X_{1j} + \beta'_{i2}X_{2j} + \beta'_{i3}E(X_{3j}|X_{1j}X_{2j}, \text{NFP}) + \beta_{i\text{NFP}}\text{NFP}_j + \alpha_i(I - p_j).$$

This can be inverted to produce, for consumer i, prices that keep him indifferent between firms. I drop both I and the level of utility since they are unimportant for our purposes.

$$p^D_{ij}(X_{1j}, X_{2j}, \text{NFP}_j) = \frac{1}{\alpha_i}(\beta'_{i1}X_{1j} + \beta'_{i2}X_{2j} + \beta'_{i3}E[X_{3j}|X_{1j}X_{2j}, \text{NFP}] + \beta_{i\text{NFP}}\text{NFP}_j).$$

Price is superscripted by D to show that it is a relationship that creates indifference for consumer i on the demand side (as opposed to being an equilibrium relationship between price and characteristics). The object the paper is interested in is

$$\frac{1}{\alpha_i}\beta'_{i3}(E[X_{3j}|X_{1j}X_{2j}, \text{NFP} = 1] - E[X_{3j}|X_{1j}X_{2j}, \text{NFP} = 0]).$$

The empirical strategy is to run the following regression:

$$p_j = \gamma'_{i1}X_{1j} + \gamma_{\text{NFP}}\text{NFP}_j + \varepsilon_j.$$

The coefficient γ_{NFP} is then (in essence) interpreted as:

$$\frac{1}{\alpha_i}\beta'_{i3}(E[X_{3j}|X_{1j}X_{2j}, \text{NFP} = 1] - E[X_{3j}|X_{1j}X_{2j}, \text{NFP} = 0]).$$

The identification of γ_{NFP} with the underlying structural information relies on three conditions being true:

1. That the equilibrium price relationship, $p^*(X_1, X_2)$, reveals the indifference curves of consumers;
2. That $(1/\alpha_i)\ \beta'_{i3}\ (E[X_{3j}|X_{1j}X_{2j}, \text{NFP} = 1] - E[X_{3j}|X_{1j}X_{2j}, \text{NFP} = 0])$ is a constant; and
3. That the omission of X_2 creates no bias.

The first condition is required if the regression is to be interpreted as revealing demand information. The second and third conditions are required for the regression to be properly specified.

The first condition, that a hedonic price function reveals demand information, is known to be true if:[2]

1. There is perfect competition.
2. There is no heterogeneity among consumers.
3. All observed firms are in the same market.

These are strong assumptions in any case, and they are particularly strong here. Since the sample is drawn from the United States as a whole, the third assumption amounts to assuming that nursing home services are sold on a national market. The paper deals with this in the best way these data allow, by analyzing separate regions separately. As to the second assumption, the paper notes that if $(1/\alpha_i)\ \beta_{3i}$ is constant across consumers, then the hedonic price function identifies demand information for this characteristic.

As to the first assumption, this is problematic for two reasons. First, as I mentioned above, these products are geographically differentiated, and since it is reasonable to believe that consumers have relatively strong preferences over their residential location, the firms in the sample are likely to have some market power owing to this differentiation. Second, and as the paper notes, CON laws limit both entry and capacity expansion in this industry. This, combined with the fact that nursing homes have very high capacity utilization and the anecdotes of waiting lists for some homes, should give us pause in assuming the costless spot market that is part of perfect competition.

The second condition requires two assumptions. First, that $\beta_{i\text{NFP}} = 0$ and that $E(X_{3j}|X_{1j}X_{2j}, \text{NFP})$ be linear in NFPs. The third condition contains, again, the assumption that geographic and other unmeasured differentiation are not important in these markets. It is, in general, very difficult to "sign" the bias that the failure of any of these assumptions might

2. Here, I am assuming that there is a single market for nursing home services and that the stochastic element in the statistical model arises exclusively from measurement error in prices. For discussion, see Rosen (1974). For discussion in a multimarket context with richer stochastic specification than I consider, see Epple (1987).

Table 10C.1 NFP Premium and Control Variables

Year	None (%)	Cost (%)	Cost, Quality (%)
1985	+9	−3	−6
1995	+10	2	−17

cause, and sorting out which of these assumptions is true and what implications for the interpretation of the results any failures have must wait for future work, probably with different data.

Before passing on to an alternative interpretation of these results, I'd like to expand a bit on what the results say. In table 10C.1, I reproduce the results from the sample means and from the regression analysis, expressed as the NFP price premium for skilled care. The columns in the table correspond to unconditional means, specification 1 from the paper ("public price"), and specification 4 from the paper ("quality"). I have interpreted the public price variables as cost controls, since in many states (at least in 1985) Medicaid paid on a "cost plus" basis.

What the results say is that, in the raw data, NFPs enjoy a 9 or 10 percent price premium. Once costs are controlled, NFPs have a much smaller (or negative) premium, and once cost and quality are controlled, NFPs have a negative premium. The paper, since it tells a demand-side story, is either interpreting the cost controls as proxies for X_2 or as controls for the fact that the market is defined too broadly.

In addition, there are some other facts in the unconditional means that bear comment. Assuming that public price is a cost proxy, NFPs in both 1995 and 1985 have higher costs than do FPs. Furthermore, using input levels and the indicators reported as quality measures, NFPs provide, in general, higher quality care. (This is consistent with other work on nursing homes; see Gertler and Waldman 1992, for example.)

I will now spin a story that rationalizes these results, using the "NFPs are different" conventional wisdom. My point is not that this story is more correct than the one the paper spins, but that the data and mode of analysis at hand do not distinguish between them.

Consider the pricing equation of an FP firm in an imperfectly competitive market:[3]

$$p^{FP} = MC(q) - D(p,q)\Big/\frac{\partial D}{\partial p}.$$

3. It is easiest to think of this as a model of monopolistic competition. For an interpretation as an oligopolistic model, consider the demand to be residual demand, after solving out for the responses of rivals.

Here, MC are marginal costs, D is the demand curve, and q is the quality of the good produced.

An NFP with conventional preferences ("profit deviating" in the language of Philipson and Lakdawalla 1997; see also Newhouse 1970) has a utility function

$$U = \pi + \lambda_1 Q + \lambda_2 q,$$

where π are profits, Q is output, and q is quality. Its pricing equation is:

$$p^{\text{NFP}} = MC(q) - \lambda_1 - D(p, q)\Big/\frac{\partial D}{\partial p}.$$

In discussing these two pricing equations, I'll proceed intuitively; however, it is not very difficult to write down a formal model rationalizing the intuition. Since the NFP has a preference for quality, per se, it is likely that it will choose a higher quality. (This is most obvious when quality is unobservable, when FPs will choose the lowest feasible level.) Consider now whether the NFP will price higher or lower than does the FP. The preference for output, λ_1, tends to decrease price; whereas the higher quality raises marginal costs and likely also raises the third, "market power," term, tending to increase price. So, the effect of NFP preferences on price is indeterminate.

When costs are controlled, NFPs will appear to have a smaller price premium than they do when costs are not controlled (since they have higher costs). Removing MC from the FP and NFP equations above leads to FPs' prices increasing relative to NFPs' prices. If we think of the residual covariation in price and quality remaining after costs are controlled as arising from the market power term, then controlling for quality should cause NFPs' prices to fall further, relative to FPs' prices. In fact, once MC and market power are gone from the pricing equation, all that is left to differentiate the two is λ_1. Thus, with cost and quality controlled for, NFPs should have a lower price than do FPs, because of their preference for output.[4]

So, a model in which NFP nursing homes are imperfect competitors with profit-deviating preferences appears to produce predictions consonant with the results found in the paper and reported in table 10C.1 and its accompanying text. What is at issue here is whether the regression reported in the paper identifies demand-side behavior, supply-side behavior, or some mixture. The story I tell above relaxes assumption 1 (perfect competition). With an imperfectly competitive market, price is a choice vari-

4. Obviously, all of this discussion proceeds as if the right-hand-side variables are exogenous, which they are not.

able of firms, they have some scope in setting it, and their objectives and costs appear in their choices (thus in prices).

"Asymmetric Information and the Not-for-Profit Sector: Does Its Output Sell at a Premium?" opens an important discussion of the strategies one might employ in evaluating empirically the validity of theories of not-for-profit behavior. The potential gains to the careful application of economic theory to a critical appraisal of agency and profit-deviating theories of not-for-profit behavior are large and, although this paper does not produce conclusive results on the matter, it is valuable in that it establishes a reference point for future investigation and helps to set the agenda for future work.

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