STRATEGIC INTEGRATION OF HOSPITALS AND PHYSICIANS

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Abstract: A striking development in the healthcare market place has been the formation of strategic relationships between hospitals and physicians. Hospital-physician integration appears to be a response to rapidly expanding managed care health insurance. We examine whether integration lead to efficiency gains from transaction cost economies thereby allowing providers to offer managed care insurance plans lower prices or whether integration is really a strategy to improve bargaining power and thereby increase prices. We find that integration has little effect on efficiency, but is associated with an increase in prices, especially when the integrated organization is exclusive and occurs in less competitive markets.

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A striking development in the healthcare market place has been the formation of strategic relationships between hospitals and physicians. By 1998, 66 percent of hospitals had either acquired or formed a long-term contract with one or more physician organizations. These relationships vary from loosely networked, open confederations to exclusive, fully integrated organizations.

Hospital-physician integration likely reflects providers' organizational responses to competitive pressures from rapidly expanding managed care health insurance. A number of authors have hypothesized that hospital-physician integration likely leads to efficiency gains by facilitating the exploitation of transaction cost economies such as being better able to deal with incomplete contracting challenges and economies of scope (Robinson and Casalino 1995 and 1996; Robinson 1997 and 1999). In this case, the more efficient integrated organization is able to offer lower prices to managed care plans. Others suggest that integration may really be an attempt to improve bargaining (market) power with managed care plans and thereby increase prices (Gal-Or 1999; Gaynor and Haas-Wilson 2000).

In this paper, we investigate the impact of hospital-physician integration on hospital efficiency, price, quantity, and quality, and examine whether the results are consistent with the transaction cost economies hypothesis or the bargaining-market power theory. The answer to this question is important for antitrust and Medicare-Medicaid contracting policies.

The general literature on vertical integration provides few clear predictions. Theoretical models posit both efficiency gains that result in lower prices and higher consumer welfare (Klein, Crawford et al. 1978; Williamson 1988), and market foreclosures that lead to higher prices and lower consumer welfare (Salinger 1988; Ordover et al. 1990; Bernheim and

Whinston, 1998). The limited empirical literature is also mixed. One study in the railroad industry finds support for foreclosure effects (Grimm, Winston et al. 1992); studies of stock market responses to vertical integration announcements in the beer and steel industries find conflicting results (Mullin and Mullin 1997; Snyder June 1996); and a recent study of vertical integration between programming and distribution in the cable television industry that finds evidence of both exclusionary effects and efficiency gains (Chipty 2001).

We use panel data from Arizona, Florida, and Wisconsin for 1994 to 1998 to estimate the impact of integration on hospital performance. We exploit differences in the performance predictions of the two competing theories across organization types to identify the model. Specifically, the transactions cost models predict lower costs and lower prices, while the market power models predict no change in costs and increases in prices, especially in relationships that are exclusive and in less competitive provider markets. We also exploit the panel to control for possible bias from unobserved heterogeneity as a result of the fact that integration is a choice.

We find strong support for the market power explanations and little support for the transaction costs economies explanations of hospital-physician integration. Specifically, integrated organizations have higher prices than stand-alone hospitals and the differences are larger for exclusive arrangements and in less competitive markets. However, integrated organizations are no more efficient than stand-alone hospitals.

Our paper proceeds as follows. First, we lay out the competing theories and predictions. Then we describe the types of integrated organizations and empirically investigate why these organizations formed. Next we present the evidence on the effect of integration on hospital performance. Finally, we draw conclusions.

I. MOTIVES

The formation of formal relationships between hospitals and physicians has been fast-paced. By 1998, 66 percent of hospitals had either acquired or entered into a partnership with one or more physician groups, twice the number in 1993 (Burns, Bazzoli et al. 2000). This fast-paced growth in hospital-physician integration likely reflects providers' strategic responses to expanding managed care. In fact, as demonstrated in Figure 1, hospitals in high-managed care areas are more likely to have vertical relationships with physicians than hospitals in low-managed care areas; only 29 percent of hospitals in low-managed care areas had vertical relationships in 1998, compared to 70 percent of hospitals in high-managed care areas.

Before managed care, indemnity insurance paid any hospital or physician chosen by a patient on a cost-plus or fee-for-service basis. Managed care brought about a change in contracting and reimbursement for hospital services. Unlike indemnity insurers, managed care plans selectively contract with hospitals in order to negotiate lower hospital prices, shift payment risk to hospitals, and form provider networks that appeal to their enrollees. Managed care plans extract price discounts by threatening to exclude providers from their selected networks. Hospitals and physicians wanting to improve their competitive position for managed care contracts try to lower costs or develop strategies to counter managed care bargaining power.[1]

One response to the rise of managed care is for hospitals and physicians to integrate. The literature provides two explanations for why hospitals and physicians have formed vertical relationships in response to managed care. The first is a transactions costs argument that such relationships increase efficiency and quality. With greater efficiency, providers are able to offer

[1] At the same time that managed care expanded, indemnity insurers also started trying to negotiate discounted rates putting further pressure on providers.

managed care plans lower prices without sacrificing quality. The second is that hospitals and physicians ally in order to improve their bargaining position with managed care plans and other insurers and thereby raise prices. The next three subsections summarize the theoretical arguments and their predictions for hospital performance.

A. Transaction Cost Economies

Before managed care, under fee-for-service payment to physicians and cost-plus payment to hospitals, there was little financial incentive for hospitals and physicians to work together to achieve economies of scope and otherwise become more efficient. In a managed care environment, where providers are paid via capitation[2] and other forms of prospective payment[3], physicians and hospitals can accrue the financial benefits of increased efficiency if they can overcome internal agency problems and take advantage of economies of scope[4].

Vertical integration may be better able to take advantage of possible economies of scope. The care of any one patient typically spans both hospital and physician office settings. By changing the process of patient care and coordinating care across sites, joint hospital-physician organizations may be more efficient. Shared information systems can be put into place to gather data on costs, quantity, quality, and monitor performance relative to benchmarks. Integrated management can facilitate the sharing and use of information and identify areas of complementarity and substitutability.

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[2] Under capitation, managed care plans pay a provider a fixed fee per insured person per month and the provider is at risk for the cost of care should the person become ill. Capitation provides an incentive for providers to keep the cost of care to a minimum.

[3] Other forms of prospective payment include paying a fixed fee to treat an illness such as Medicare Diagnostic Related Groups or a fixed per diem. In these cases the provider is at some financial risk for the costs of care.

[4] There is a large literature describing the pathways by which hospital-physician integration might be able to improve efficiency and quality. For example see Burns and Thorpe (1993), Morrisey, Alexander, et al. (1996), Robinson, and Casalino (1997), Robinson (1997), and Snail and Robinson (1998).

Integrated organizations may be better able to financial incentives, such as bonuses or withhold pools, to solve agency problems (Klein, Crawford et al. 1978; Williamson 1988). A patient's use of hospital resources is in large part the physician's choice; e.g. the length of stay in the hospital, the number of diagnostic tests and the aggressiveness of treatment. In unintegrated settings the marginal cost of hospital resources to the physician is close to zero and well below the marginal cost of supplying hospital services. By integrating and restructuring financial incentives, the interests of hospitals and physicians may become more closely aligned and thereby reduce costs.

There are theoretical reasons for hypothesizing that not all types of organizations will be equally successful in reducing transaction costs or controlling clinical costs. Fully integrated firms can strengthen administrative controls and achieve better cost and quality control through strong group norms, peer pressure, and integrated finances. However, they face attenuated incentives on the part of physicians, if physicians are placed on salary and no longer own and reap direct benefits from their assets (Gaynor and Gertler 1995). Fully integrated firms are also better able to adapt to changes that require coordinated action, but not individual action.

If there are efficiency gains, then the integrated hospital is a better position to compete for managed care contracts. It can offer managed care plans a lower price for the same or better level of quality. In this case, integrated hospitals will have lower costs of care, higher managed care volume, and lower managed care prices.

There is one case, however, where hospital prices might rise due to transaction cost gains. Integration may also reduce the administrative costs associated with the managed care contracting ("Coasian" transaction costs). Networks may lower contracting costs between a health plan and numerous providers, by creating a single point of contracting. By networking

with physicians, hospitals can streamline marketing, contracting and negotiation with health plans, limit the number of parties involved, and reduce transactions costs (Baker 1999). The surplus (or gain) from lower transactions costs may be shared between the health plan and the integrated entity leading to higher hospital prices. In this case we expect to see (at least weakly) higher provider prices and higher managed care volume with no change in the costs of care.

Despite theoretical grounds to believe that hospital-physician integration might lower costs and improve quality, there are few studies that assess these efficiency claims. The few studies that exist provide conflicting results[5]. However, all of these studies used cross-sectional data and treated the organizational form as exogenous.

B. Market-Bargaining Power

There are several different theories by which hospital-physician integration may be used to increase market power. Gal-Or (1999) considers the case where hospitals and physicians negotiate with insurers as a unit. If the hospital-physician unit fails to reach an agreement with an insurer, both hospital and physicians drop out of the insurer's network. This would lead to a decline in insurer demand by subscribers, thus the hospital-physician organization can bargain more aggressively. Gal-Or demonstrates that mergers between hospitals and physician practices can enhance their bargaining power relative to insurers, even when the relationship is not exclusive. However, there bargaining power is obviously stronger if the relationship is exclusive.

Second and more generally, Bernheim and Whinston (1998) and Riordan and Salop (1995) demonstrate that vertical relationships can confer market power if there are barriers to entry. Entry barriers can stem from cost advantages, sunk costs, preentry strategic behavior, or

[5] Empirical studies of the effect of hospital-physician integration on hospital costs and profits include Alexander and Morrisey (1988), Conrad and Shortell (1996), Dynan, Bazzoli, et al. (1992), Project Hope (1996).

managed care plans' propensity to contract with networks of providers. Hospitals and physicians may be able to raise barriers to entry by forming exclusive relationships. If providers cannot compete effectively without access to a network, this may harm competition in those markets. The exclusivity of the network relationship and the competitiveness of the provider market also are important. With exclusive arrangements, health plans may not be able to access high quality or low cost providers without contracting with the integrated entity. Consequently, health plans may not be able to switch easily to other providers or integrated entities in response to price increases. The less competitive the market, the more likely such integrated entities are able to prevent managed care plans from switching their enrollees to other providers.

Third, hospital-physician integration may create an advantage by increasing costs for potential entrants through "most favored (MFN)" clauses in purchaser contracts (Baker 1996; Gaynor and Vogt 1999; Gaynor and Haas-Wilson 2000). A MFN clause is an agreement in which the seller (e.g., hospital-physician entity) agrees not to charge a buyer more than the lowest price is charges any other buyer. MFN clauses used by dominant insurers may decrease health care providers' incentives to lower prices to other insurers. These clauses may lead to higher prices by raising rival insurers' costs and deterring entry into the insurance market.

Fourth, in a model of price competition with heterogeneous products, hospitals may be able to increase their market power by differentiating their product through physician alignment. Alignments may increase physician loyalty to a given hospital, thereby increasing admissions. Consequently, the price elasticity of demand for a hospital's services would fall and mark-ups could increase. Product differentiation softens competition because price-cutting is less effective at taking rivals' business (Cabral 2000; Pepall and Richards 2000).

Finally, vertical relationships also may confer market power by facilitating horizontal collusion (Baker 1999). The improved data systems and coordination of prices for the network product also may lead to coordination of prices for the unbundled products.

C. Comparison

The two bodies of theory have very different implications for performance. The transactions costs economic (TCE) models predict lower costs of care, higher managed care volume, and lower managed care prices. These effects should not depend on whether the relationship is exclusive or on the competitiveness of the hospital market. The market power models predict that integration does not affect efficiency (i.e. costs or quality), but rather leads to greater market power and therefore prices. Moreover the price increases are greater if the arrangement is exclusive and in less competitive hospital markets.

II. TYPES

In practice, hospital-physician integration takes on a variety of forms, reflecting different types of risk sharing, integration of operations, degrees of exclusivity, and capital investment[6]. Arrangements range from loosely coupled forms of contracting, such as flexible joint ventures and shared administration to tight arrangements whereby the hospital purchases physician practice assets and the new entity engages in risk-based contracts with insurers. Hospitals also differ with respect to whether these arrangements are centralized or decentralized; in some cases individual hospitals have formed these arrangements, in others they are sponsored at the hospital-system level.

[6] For descriptions of the various forms of integration see Baker 1989; Burns and Thorpe 1993; Morrisey, Alexander et al. 1996; Robinson and Casalino 1996; Snail and Robinson 1998; Burns, Bazzoli et al. 2000.

We focus on the five most common types of arrangements: Independent Physicians Associations, Open Physician-Hospital Organizations, Closed Physician-Hospital Organizations, Management Service Organizations, and Fully Integrated Organizations. The attributes of these arrangements are summarized in Table 1. Figure 2 shows the frequency of each of the forms of integration both nationally and in our sample.

Individual Practice Associaitions (IPAs) are loose contractual networks rather than integrated firms whose purpose is to hold managed care contracts and to assist individual physicians in obtaining managed care contracts. Burns, Bazzoli et al. 2000 place IPAs in the lowest level of integration group as measured by standardized business practices, joint planning, and clinical integration. By reducing contracting costs, IPAs may result in more managed care contracts and possibly higher prices. Conversely, hospitals with IPAs are less likely to have risk-based global capitation contracts (Bazzoli, Dynan et al. 1999/2000) or affect costs or quality.

"Open" Physician Hospital Organizations (OPHOs) are joint ventures between hospitals and physicians to facilitate managed care contracting, provide administrative services to physicians, and manage ambulatory care facilities where the physicians work. The OPHO allows physicians to maintain separate, independent offices and continue to own their own practices, but links physicians together through contracts. The OPHO allows physicians and hospitals to retain their autonomy over business and clinical operations. These arrangements have centralized administration to facilitate contracting with health plans. Burns, Bazzoli et al. 2000 place OPHOs in the moderate level of integration category. The OPHOs may lead to more managed care contracts and higher prices by either reducing costs or by increasing bargaining power with plans.

"Closed" Physician Hospital Organizations (CPHOs) are similar to OPHOs except that they also selectively contract with physicians based on quality and cost considerations, whereas OPHOs do not. Because closed PHOs form exclusive relationships with physicians they may be able to coordinate care better than their open counterparts. (Bazzoli, Dynan et al. 1999/2000) classify CPHOs into the high integration category. Because of their close relationships with hospitals, CPHOs may also improve efficiency through standardization, leading to lower productions costs and potentially higher quality. However, they also may raise prices by improving bargaining power with plans, particularly due to their exclusive nature.

Management service organizations (MSOs) are similar to CPHOs except they typically buy the physical assets of the participating physicians and provide administrative services (e.g. billing services and record-keeping) to the practice for a fee. Like CPHOs, the relationship with physicians is exclusive and MSOs act as agents to hospital and physicians in contracting with managed care plans (Morrisey, Alexander et al. 1996). (Bazzoli, Dynan et al. 1999/2000) classify MSOs into the same integration category as CPHOs. Because of their similarities, we pool MSOs into the CPHO category and refer to both types as CPHOs.

Fully integrated organizations (FIOs), such as medical foundations and salary models, are the most closely related, exclusive entities. They hire physicians as salaried employees, purchasing both physical and intangible assets (i.e., the entire practice) and often consolidate physicians into centralized locations (Morrisey, Alexander et al. 1996; Snail 1999). Their effect on costs and quality is predicted to be stronger than that of CPHO. Clinically, they have the greatest potential for coordinating care and improving efficiency, although they face the greatest moral hazard risk due to attenuating incentives for physicians who are placed on salary. The FIOs are the most likely to accept risk-based capitation contracts from HMOs (Burns, Bazzoli et

al. 2000). (Bazzoli, Dynan et al. 1999/2000) classify FIOs as highest form of integration. In addition to being more efficient, FIOs may be able to improve bargaining power and transactions costs, thereby leading to higher prices.

The organizational variety of hospital-physician relationships is used to test the competing hypotheses. Table 2 maps the predictions from transaction costs and market power theory to the organizational typology. Network-style organizations, IPAs, which are primarily contracting vehicles, allow a test of "Coasian" transaction cost-related explanations for vertical integration. In contrast, OPHOs, CPHOs, and FIOs allow a test of the transactions costs and bargaining power explanations.

III. INTEGRATION

A key methodological concern in analyzing the effect of integration on hospital performance is that the existence of an integrated entity is not randomly determined across hospitals, but rather is the result of a strategic choice. We view integration as a response to the rise of managed care. As managed care penetrates into a market, those providers that think they are most likely to capitalize from integration will be the ones to choose this strategy. Whether providers respond by integrating depends in part on (partially) unobservable factors such managerial ability, competitive strategy, and technology. These unobserved characteristics are probably correlated with performance, i.e. costs, quantities, prices, and quality. Consequently, we might falsely attribute performance differences estimated from cross-sectional analyses to integration when, in fact, performance reflects these underlying but unobserved organizational abilities.

Our identification strategy is to take advantage of the panel nature of the data and use fixed effects to control for unobserved hospital and market characteristics that might confound

the estimated impacts. The fixed effects specification essentially compares the change in outcomes in hospitals that integrate to the change in the outcome of comparison hospitals that do not integrate over the same period of time. However, fixed effects only control for unobservable characteristics that are constant over time. If some hospitals choose to integrate as a response to managed care and unobserved fixed factors, then fixed effects estimates are consistent.However, if integration is driven by time-varying idiosyncratic shocks, then the fixed effects strategy breaks down. Such time-varying shocks could be market-wide, such as managed care penetration or input costs or they could be or hospital-specific, such as productivity or cost shocks. While market demand shocks are not captured through fixed effects, they are in part controlled for using observed market changes, such as managed care penetration, wage index variables, and time dummies. We are not able to control for hospital-specific productivity shocks, which could be a problem if they drive organizational change.

A. Methods

In order to better understand what drives integration and to evaluate our fixed effects strategy, we investigate the empirical determinants of integration using a sample of non-governmental public, general, acute hospitals from Arizona, Florida, and Wisconsin from 1994 to 1998.[7] The three major sources of data are (i) the American Hospital Association's (AHA) Annual Survey of Hospitals, which provides data on strategic alliances, hospital ownership, bedsize, and teaching status; (ii) hospital-level annual financial data collected by the state agencies, which provide information on hospital operating costs and payer discounts; and (iii) patient-level discharge data, which provides information on hospitals' discharges and days of care by payer type, case mix--a measure of patient severity or intensity of care, county-level

[7] Public hospitals, specialty hospitals (e.g., psychiatric) and those with less than 100 discharges are excluded.

managed care penetration, and quality indicators. Table 3 provides descriptive statistics for this and all subsequent analyses.

We estimate a first-order markov transition model of change of organization type. The model estimates the determinants of the probability that a hospital transitions from one organizational type into another. This model can be estimated using a multinomial logit where the dependent variable is the state to which the hospital transitioned, as a function of its previous state and other covariates (Amemiya 1985).

The other covariates include measures of the importance of managed care, productivity shocks, and hospital and market characteristics. To examine the role of managed care in integration decisions we include three covariates: (i) lagged managed care penetration into the county in which the hospital is located to account for the size of the managed care market, (ii) lagged change in managed care penetration to account for whether the managed care market is growing, and (iii) lagged share of the hospital's patients who are enrolled in managed care to account for the importance of managed care to the hospital. To examine whether integration is driven by productivity shocks we include the lagged change in average cost per day. The characteristics include lagged average cost, bed size, teaching status, ownership status, whether the hospital is located in a MSA, and a market hospital wage index

Table 4 presents a transition matrix showing the proportion of hospitals that switch from one type of vertical relationship (including none) to another. An observation is a hospital in a given year. Over the sample period, more than one-quarter of the observations changed their organizational status. Notice that while there are a substantial number of hospitals that transition into more integrated organizational forms, there is also a large number of hospitals that transition into less integrated states.

B. Results

Table 5 presents the estimation results. The results are consistent with the hypothesis that integration is a response to managed care. Specifically, hospitals in high managed care markets, in markets with high managed care growth, and with high-managed care dependence are more likely to integrate into IPAs, OPHOs and CPHOs. Another important result is that the measure of idiosyncratic productivity shocks in not a significant predictor of adopting any of these types of integration (fifth row). These results lend support for the use of fixed effects to control for unobserved heterogeneity bias.

Noticeably different is the formation of the Fully Integrated Organization (FIO), which does not appear correlated with managed care. Rather, the results suggest that nonprofit, teaching hospitals with large average costs are the ones most likely to form FIOs. In fact, there are no for-profit FIOs in the data set. It is likely that these hospitals are large nonprofit research and teaching institutions. This suggests that these hospitals maybe integrating for other reasons. We will test this hypothesis by examining the effect of integration on other performances measures, such as the provision of charity care and quality of care.

IV. EFFICEINCY

In this section, we examine the effect of integration on hospital costs in order to test the hypothesis that integration improved hospital efficiency. The data for these analyses come from the State Hospital Financial reports and Patient Discharge Files. Summary statistics for all variables used in this analysis are reported in Table 3.

A. Methods

We estimate a multi-product Cobb-Douglas cost function modified by including the squares of the output variables. Two versions are tested, one using the log cost per patient day and the other using log cost per patient discharged. Costs per discharge and per day were constructed by dividing total operating expenses (less depreciation plus interest) as reported on each hospitals' financial data divided by total discharges and days respectively.

The output vector for the model that uses the log cost per patient includes the number of managed care patients and its square, the number of indemnity patients and its square, the number of other payers' patients and its square, the average length of stay at the hospital, and a casemix index of the illness severity of patients. The output vector for the model that uses the log cost per patient day replaces the patient variables with managed care, indemnity and other patient days and their squares. The other independent variables include a local market hospital wage index, and the number of beds and the integration indicator variables. All models are estimated with year fixed effects that vary by state to capture the changes in the regulatory environment and other input prices as well as hospital fixed effects that control for other hospital characteristics that are fixed over the time period.

B. Results

The first two columns of Table 6 report the results for the cost per day model and costs per patient. The results show that hospitals with an integrated organization of any type do not have costs different from unintegrated hospitals. In fact, the integrated organization variables are individually and jointly not statistically significant from zero even at the 10 percent level. This suggests that there were virtually no gains in efficiency from integrated organizations. The other coefficients are significantly different from zero and consistent with behavior one would expect for cost functions, e.g., average costs increase with wages.

A potential problem arises because a large number of hospitals had already integrated at the beginning of our sample period. Hospitals that integrated early may have been able to exploit efficiency gains differently from those that integrated later. Consequently, the above results could be driven by differences between early and late adopters. We reestimated the models excluding hospitals that had already integrated by the first year and those results are reported in the second and third columns of Table 6. The results did not change suggesting that there were no differences between early and late adopters.

Another possible weakness is that we treat hospitals that add and drop integrated organizations symmetrically. We examine whether the results change when hospitals that disintegrate are excluded from the analysis. The results, reported in the last two columns of Table 6, demonstrate that there is no difference when hospitals that disintegrate are excluded.

IV. PRICES AND VOLUMES

To examine the effects of integration on prices and volumes we regress prices and volumes against the integration variables controlling for the wage index, managed care penetration in the county, hospital fixed effects, and year fixed effects that were allowed to differ by state. We exclude Fully Integrated Organizations that also sponsor their own integrated insurance products since the observed price likely reflects an internal transfer price, rather than a market price.

A. Methods

Payer volumes are measured as the number of patients treated (discharged) in a year and is obtained from the patient-level discharge data. The data contain whether a patient was covered by managed care or indemnity coverage. Total payer volume is the sum of all discharges for a given payer type in the hospital. These variables also are log-transformed due to their skewed distribution.

Prices were constructed in two steps using both states' hospital financial and discharge data. The first step is to adjust the hospital charge per day for the differing health status of patients across hospitals, by creating a standardized charge for each hospital using the patient-level discharge data. These are obtained for each year by regressing the patients per diem charges on diagnosis related group dummies, length of stay, age dummies, gender, and a fixed effect for each hospital, similar to Keeler (1999). For each year, the analysis then calculates the average predicted price for each hospital using the entire patient sample for all hospitals. This predicted average charge represents the adjusted hospital-specific charge per day or "standardized price." These standardized prices are calculated for indemnity and managed care payers separately. Due to the skewed nature of the log-scale residuals, prices in this stage were

estimated using a generalized linear model with gamma distribution and log link function (Mullahy and Manning, 1998).

The discharge data contain information on a patient's total charge; however, these "charges" are effectively list prices, gross of insurer discounts. Hospital average price discounts are calculated from the annual financial datasets for managed care and indemnity insurers respectively.[8] To obtain an estimate of transaction prices rather than list prices, the average discounts for managed care and indemnity lines of business are obtained from the financial data and are applied to the standardized charges.

B. Results

Table 7 presents results for managed care prices and managed care patients. The first three columns show results for managed care prices using three different specifications, the next two for the number of managed care patients. The key independent variables are the vertical integration measures. Other independent variables are the area input costs and managed care penetration, hospital fixed effects, year effects, and hospital-year interactions.

Columns labeled (1) show the simplest specification. Here both Open and Closed PHOs had positive and significant effects on managed care prices and volumes as predicted by the market power theories. As IPAs do not exhibit similar increases, there is no evidence that these increased prices results from administrative or Coasian transaction costs savings. The Fully Integrated Organization appears to have no effect on managed care prices and volumes. Further, while wages and managed care penetration does not seem to affect price, managed care penetration does significantly and not surprisingly increase volume. The state-year and hospital fixed effects are jointly significant, and a Hausman test rejects random effects.

[8] For each payer, the average discount is calculated as total charges less total discounts divided by total charges.

The market power theories further predicted that price effects would be greater in less competitive markets. The models in column (2) explore whether the increases in prices and volumes are driven by hospitals that are located in competitive markets by including interactions between the integration variables and whether the hospital was located in an urban, metropolitan statistical area (MSA). The MSA variable is used a proxy for the competitiveness of the market, with MSAs having greater competition than nonMSAs. This permits a test of whether the effect of vertical relationships is associated with the degree of local competition. A F-test of the hypothesis that the MSA-integration interactions are jointly zero is rejected at .05 level for managed care prices, but not rejected for volume.

Furthermore, the specifications in columns (2) also explore whether ownership type affects the extent to which market power is used. For-profit and nonprofit hospitals may have different capacities to exploit their market power or may have different objective functions that alter the use of that power. Consequently, the models include interactions between the vertical relationship and the for-profit status of the hospitals. This permits a test of whether the effects of vertical relationships are driven by the ownership status of the hospital. A F-test of the hypothesis that ownership-integration interactions are jointly zero is rejected at the .05 for the price model, but is not rejected for the volume model.

Finally, we estimated parsimonious models that only include the significant interactions. This model for prices is reported in column 3. Since all the interactions where rejected for volume, we take the model in column (1) as the preferred model. Using the price model in column (3) and the volume model is column (1), we calculate the estimated effect of integration on managed care prices and volumes by market and ownership type and report these results in table 9.

The results indicate that OPHOs have prices that are about 6 percent higher than unintegrated hospitals and these differences do not vary with ownership or market. The CPHOs show similar price increases as the OPHOs in competitive (MSA) markets. However, CPHOs obtain two to four times the price increase of OPHOs in the less competitive (nonMSA) markets. This is consistent with market power theoretical predictions that price effects would be greatest for exclusive arrangements in less competitive markets. With regard to volumes, both Open and Closed PHOs have larger volumes than unintegrated hospitals, with the Closed type getting about one-quarter more than the Open type. Overall, the results suggest that Open and Closed PHOs have market power that results in higher managed care prices and volumes.

Results for indemnity prices and volumes are presented in Table 8 in a similar fashion to the managed care results in Table 7. Similar to the managed care results, Open and Closed PHOs have higher indemnity prices than unintegrated hospitals, which is consistent with the market power theories. Moreover, the MSA-integration and ownership-integration interactions as reported in column (2) are both jointly significant. The parsimonious version of the interactions model is reported in column (3). While there seem to be positive price effects, all forms of integration have the same volume of indemnity patients as unintegrated hospitals in both the simple and interacted models.

Finally, using the price model in column (3), we calculate the estimated percentage effect of integration on indemnity prices and volumes and report these results in table 10 by market and ownership type. The results indicate that for-profit Open PHOs have prices that are about 18 percent higher than unintegrated hospitals and these differences do not vary with market. The Closed PHOs show similar price increases as the Open PHOs in competitive (MSA) markets. However, Closed PHOs obtain higher price increases than Open PHOs in the less competitive

(nonMSA) markets. This is consistent with market power theoretical predictions that price effects would be greatest for exclusive arrangements in less competitive markets.

As discussed in the cost function analysis, there are two potential problems with our data. First, a number of hospitals had already integrated by the beginning of our sample period and they may be different from hospitals that integrated during our sample period. Second, our analysis so far treats hospitals that add and drop integrated organizations symmetrically. To test the robustness of the findings, we reestimated the price and volume models first excluding the hospitals that were integrated at the beginning of our sample period and second excluding the hospitals that disintegrated during our sample period. While the reduction in sample size creates some sparse cells for the interactions, our primary results and conclusions appear to be robust to these concerns. In these models we still find that integrated organizations had higher prices and that the differences where greater in exclusive organizations and in small markets[9].

[9] The results of these analyses are available from the authors upon request.

V. QUALITY

The transactions cost economies theories also predict that quality of patient care could rise if physicians and hospitals are better able to coordinate the clinical process of patient care across settings. Integration can improve such coordination by providing an institutional setting for cooperation. Integrated organizations can overcome informational problems through shared information systems across physician and hospital settings, and are able to implement financial incentives to remove agency problems. These changes are more likely to occur among the more integrated relationships, because these organizations are better able to implement the institutions necessary to change the process of patient care.

An understanding of how quality changes as a result of integration is important from the perspective of both market power and efficiency theories (Gaynor and Haas-Wilson 1999). While it is possible that higher prices are the result of greater bargaining power from vertical integration, it is also possible that they reflect higher quality. If the observed price increases are associated with quality improvements, this is consistent with hospitals attempting to appeal to managed care firms that selectively contract with quality providers. Observing higher prices without changes in quality is consistent with a finding of market power.

The quality analysis also is important for drawing conclusions about efficiency gains. The cost analyses alone cannot separate the effects of cost changes due to production efficiency from cost changes due to changes in quality. The lack of findings regarding costs may be due to offsetting effects of simultaneously experiencing greater efficiency and higher quality. If we observe quality improvement with no change in costs, this is evidence of overall improvements in efficiency, while no quality improvement paired with no cost changes implies no efficiency effects.

A. Methods

Quality measures were created from the patient-level discharge data.[10] These indicators were grouped into four types: 1) rates of potentially avoidable inpatient-mortality following common elective hospital procedures, 2) surgical complications, 3) rates of discretionary procedures considered overused, and 4) ambulatory care-sensitive conditions (ACSC), which are conditions that rarely require hospitalization if they receive good monitoring and surveillance.[11] The first three measures focus on the quality of inpatient care, while avoidable hospitalizations generally measure the quality of outpatient care and other nonhospital aspects of the care system. Higher rates of avoidable hospitalizations indicate that there are opportunities for quality improvement in outpatient and preventive care settings. Previous research has shown that these indicators are sensitive to changes in financial incentives for hospitals (Ho and Hamilton 2000). We test whether they rise or fall with changes in organizational integration.

B. Results

For each quality model, the patient population is divided into those who are at risk for a given condition and among them those who experienced the adverse event. The risk population

[10] We used quality indicators developed by the "Healthcare Cost and Utilization Project" (HCUP-3) Ball, J. K. and A. Elixhauser (1999). The HCUP was intended to develop standardized, user-friendly quality indicators that could be calculated from available patient-level discharge data as used in this project.

[11] In this analysis, "in-patient mortality" includes patients at risk after six common elective procedures (hysterectomy, laminectomy/spinal fusion, cholecystectomy, transurethral prostatectomy, hip replacement and knee replacement). "Surgical complications" after major surgery include pulmonary compromise, acute myocardial infarction, gastrointestinal hemorrhage or ulceration, venous thrombosis or pulmonary embolism, mechanical complications due to device, implant or graft, urinary tract infection, and pneumonia. "Utilization" includes incidental appendectomy among elderly, hysterectomy, laminectomy, transurethral prostatectomy, radical prostatectomy. All of "utilization" procedures are considered to be potentially overused, either because the risk of complication is outweighed by potential preventive effects, or because they are inferior to noninvasive alternatives or watchful waiting. The reader is referred to the quality indicator manual for a review of the literature for each indicator Ibid.. Finally, "avoidable hospitalizations" include several ambulatory-care-sensitive conditions, pediatric asthma, immunization-preventable pneumonia among the elderly, stroke among nonelderly adults, diabetes (short-term and long-term complications).

varies by age, gender, diagnosis, and procedure depending on the given indicator. For example, only patients having had the particular surgery are at risk for post-surgical complications.

The quality analysis uses patient-level data, controlling for age, diagnosis, and gender, in addition to hospital and state-year fixed effects. We estimate separate models for the managed care and indemnity populations, which also controls for the fact that changes in quality may reflect changes in the mix of patients admitted. The key independent variables are the integration indicators.

Tables 11 and 12 present the quality regression results for managed care patients and indemnity patients, respectively. Columns labeled (1) show the average effects of integration on quality while columns labeled (2) use the parsimonious specification from the price analyses to examine whether these effects vary by hospital ownership or by local competitiveness (MSA area). Hospitals with IPAs and OPHOs exhibited no changes in the quality measures.

Closed PHOs performed better on the measure of surgical complications in both the managed care and indemnity patient populations. This means that a portion of the higher price in hospitals in CPHOs may be due to modestly higher quality and not bargaining power alone. However, the effect is no larger in less competitive (MSA) markets where there the price is higher nor is it different by ownership status. This and lack of improvement for utilization, mortality and ACSC quality measures suggest that this effect on price is likely to be small. Therefore we conclude that quality improvement does not explain much if any of the higher prices for CPHOs .

Fully Integrated Organizations are associated with improvements in the utilization, surgical complication, and ASCS measures. Unlike the CPHOs , the FIOs experienced quality improvements without associated price gains.

VI. ARE FULLY INTEGRATED ORGANIZATIONS DIFFERENT?

Fully Integrated Organizations appear to be different from the other integrated organizations and likely form for other reasons than a response to managed care. As shown previously, while formation of Open and Closed PHOs is driven by managed care, the formation of FIO adoption is not. Moreover, in contrast to PHOs, it is the large nonprofit, teaching hospitals that are likely engaged in research that form FIOs. While the Open and Closed PHOs charge higher prices than stand-alone hospitals, FIOs appear to charge about the same. Finally, FIOs are the one organizational type that provides higher quality of care.

This suggests that FIOs might form to better serve the community in terms of better quality and other purposes. We test this hypothesis by examining the effect of integration on the provision of charity care. Table 13 presented the estimated effects of integration on charity care. Here, uncompensated care, measured as total uncompensated care days in column (1) and total uncompensated care discharges in column (2), is modeled as a function of the integration indicator variables, market level variables, hospital fixed effect, and time-state fixed effects. Only FIOs are associated with statistically significant increases in uncompensated care.

VII. CONCLUSIONS

In this paper we argue that the recent wave of hospital physician integration is a strategic response to counter the rising monopsony power of managed care and is one of the sources of the recent increase in health care costs. The empirical evidence indeed demonstrates that most of the forms of hospital-physician integration occurred in markets where managed care grew rapidly. Moreover, we find strong support for the market power explanations and little support for the transaction costs economies explanations of hospital-physician integration. Specifically, we find

that integrated organizations have higher prices than stand-alone hospitals and that the differences are larger for exclusive arrangements and in less competitive markets. However, we found that integrated organizations are no more efficient than stand-alone hospitals.

There is one notable exception. Large nonprofit teaching hospitals apparently formed Fully Integrated Organizations not as a response to managed care, but rather for other more noble purposes. Unlike the others, these forms of integration are not more prevalent in areas with a high degree of managed penetration. In addition, the FIOs do not have higher prices or lower costs than stand-alone hospitals. However, they do provide higher quality care and provide more charity care than stand-alones and the other forms of integrated organizations.

One limitation of our analysis is that we only investigate the effect of integration on hospital performance and not on primary care performance. It is possible that cost savings occurred in the physician sector and are not captured here. However, no changes were noted in hospitalization for ambulatory sensitive conditions, a preliminary indication that the process of care may not have significantly changed in the outpatient setting either.

Nonetheless, the findings have important implications for public policy and how vertical integration between hospitals and physicians is viewed. This study provides evidence to support efforts by antitrust policymakers to more closely scrutinize hospital-physician integration, and public programs, such as Medicare and Medicaid, should reconsider their policies that promote hospital-physician integration.

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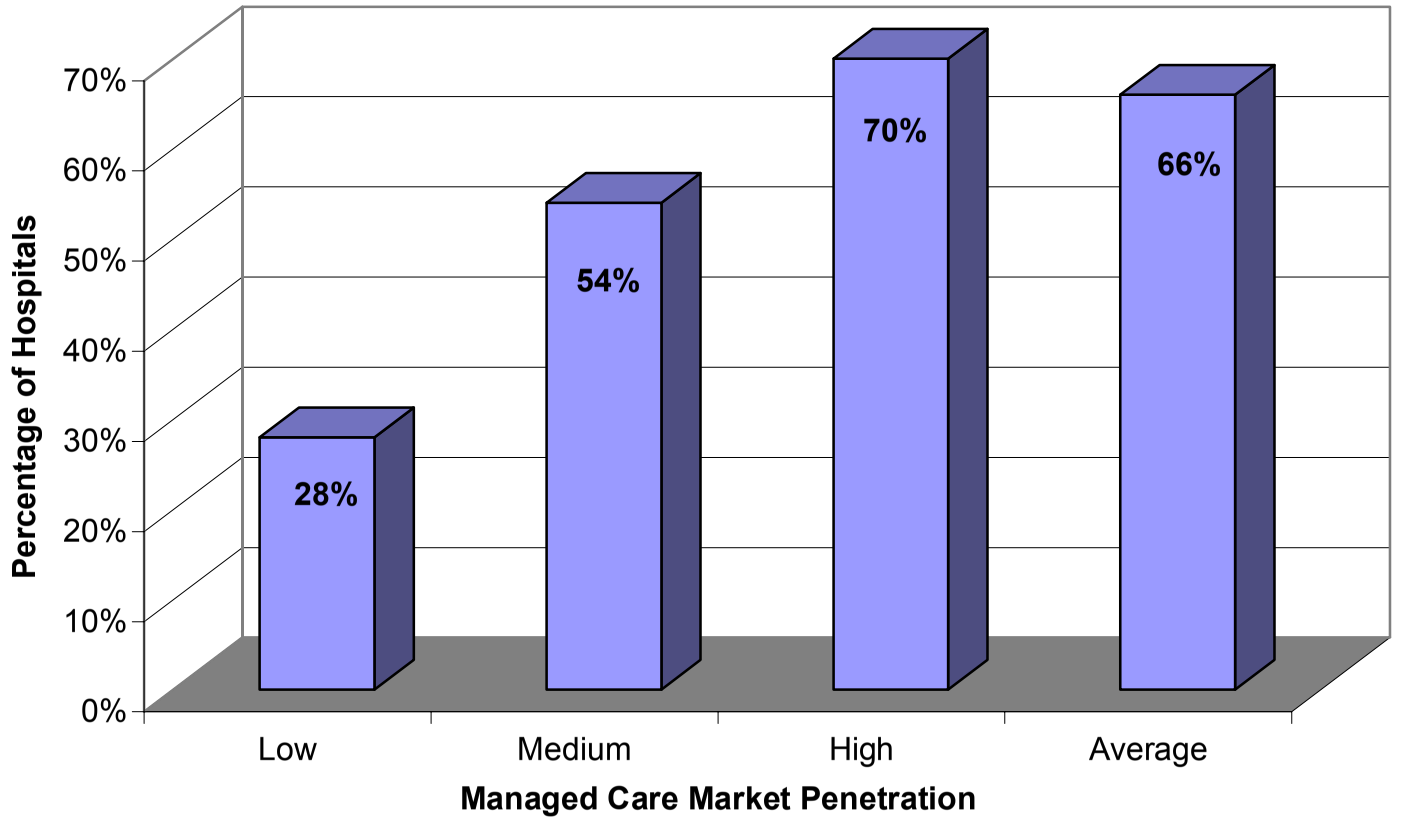
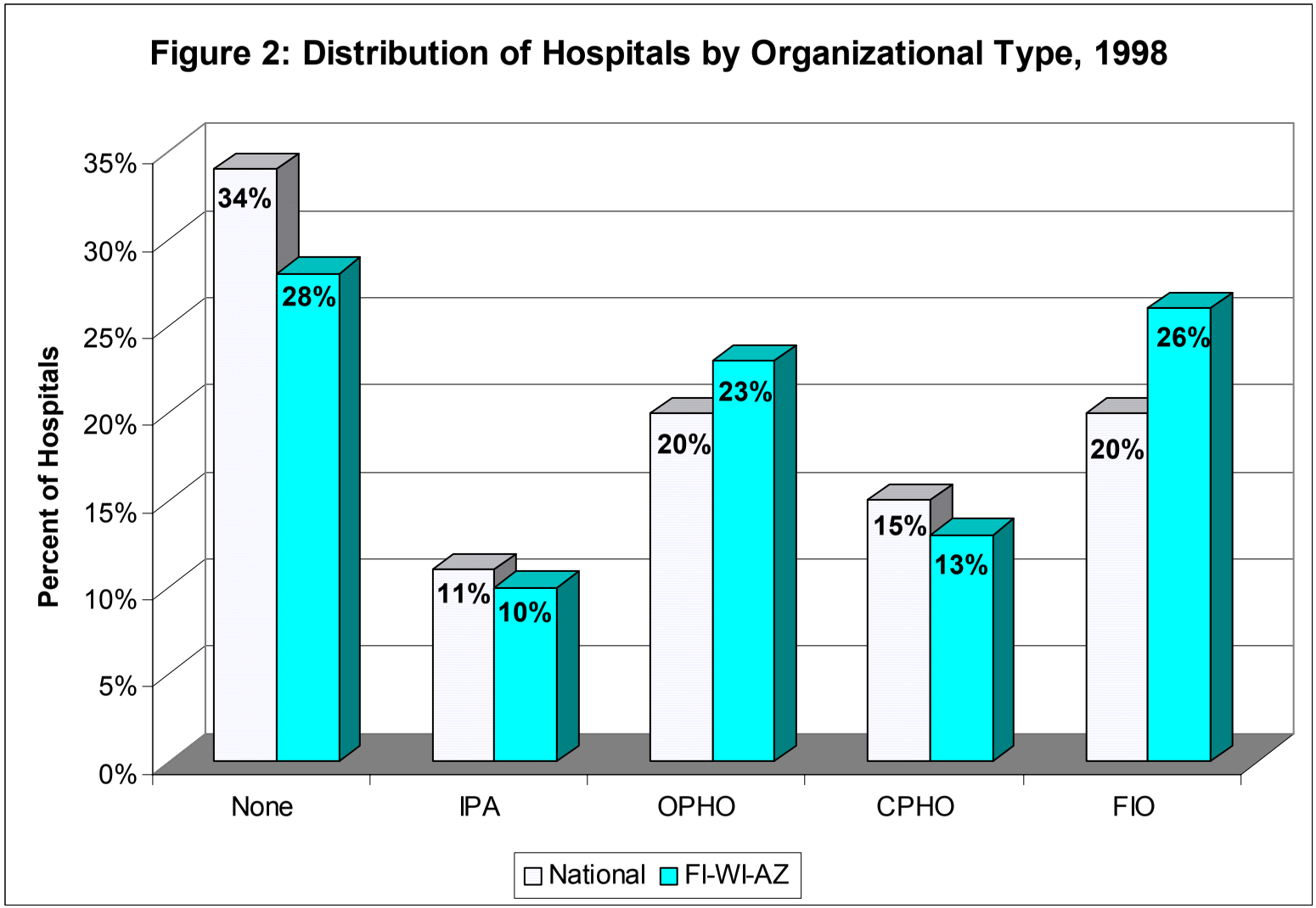
Figure 1: Percent of Hospitals in Integrated Organizations With Physicians, 1998



Source and Notes: The data on hospital-physician integration are from the American Hospital Association's Annual Surveys of Hospitals 1994 and 1998. Managed care penetration is calculated from State hospital patient discharge data provided by the state agencies from Arizona, Florida, and Wisconsin. A low managed care county has up to 10 percent of patients enrolled in managed care (25th percentile), while a high managed care county has more than 30 percent of hospital patients enrolled in managed care (75th percentile or more). Medium managed care is defined as counties with 10 to 30 percent of hospital patients enrolled in managed care.



Source: Authors calculations using data from the American Hospital Association's Annual Survey of Hospitals, 1998.

Table 1: Characteristics of Physician-Hospital Vertical Relationships

	Independent Practice Association	Open Physician Hospital Organization	Closed Physician Hospital Organization	Management Services Organization	Fully Integrated Organization
Contracting w/ Managed Care Plans	X	X	X	X	X
Administrative Services		X	X	X	X
Coordinate Care			X	X	X
Physicians Exclusive to Hospital			X	X	X
Fully Integrated Ownership				Some	X
Physicians Salaried					X
Provide Insurance					Some

Table 2: Predicted Effects of Integration on Performance

Organizational Type	Performance Indicator	Predictions of the Competing Theories			
		Coasian Contracting Transaction Costs	Transaction Cost Economies	Bargaining / Market Power*	
				More Competitive Market	Less Competitive Market
Independent Practice Association	Managed Care Price	+			
	Managed Care Volume	+			
	Indemnity Price				
	Indemnity Volume				
	Costs				
Open Physician Hospital Organization	Managed Care Price	+	–	+	++
	Managed Care Volume	+	+	+	++
	Indemnity Price		–	+	++
	Indemnity Volume		+	–	–
	Costs		–		
Closed Physician Hospital Organization	Managed Care Price	+	–	++	++
	Managed Care Volume	+	+	++	++
	Indemnity Price		–	++	++
	Indemnity Volume		+	–	–
	Costs		–		
Fully Integrated Organization	Managed Care Price	+	–	++	++
	Managed Care Volume	+	+	++	++
	Indemnity Price		–	++	++
	Indemnity Volume		+	–	–
	Costs		–		

* Market Power Effects of Closed Physician Hospital Organizations and Fully Integrated Organizations are expected to be larger than Open Physician Hospital Organizations because of physician exclusivity; and the effects are expected to be larger in less competitive hospital markets.

Table 3: Descriptive Statistics

	N	Grand Mean	Standard Deviation	Mean 1994	Mean 1998
Independent Practice Association (=1)	1257	0.11		0.07	0.10
Open Physician Hospital Organization (=1)	1257	0.19		0.17	0.18
Closed Physician Hospital Organization (=1)	1257	0.13		0.10	0.10
Fully Integrated Organization (=1)	1257	0.16		0.08	0.18
Managed Care Patient Price Per Day ($)	988	1,389	390	1,280	1,444
Indemnity Patient Price Per Day ($)	1148	2,244	279	2,036	2,370
Number of Managed Care Patients	1257	1,665	2,686	1,296	2,005
Number of Indemnity Patients	1201	1,088	1,259	1,199	948
Average Cost per Patient Day ($)	1167	1,874	678	1,581	2,165
Average Cost per Patient ($)	1167	7,818	2,575	7,244	8,553
Managed Care Penetration in County	1257	0.21	0.13	0.17	0.26
Market Hospital Wage Index	1257	1,332	116	1,236	1,416
For-profit Hospital (=1)	1228	0.23		0.24	0.22
Hospital Located in a MSA (=1)	1228	0.59		0.60	0.60
Teaching Hospital (=1)	1228	0.20		0.17	0.20
Hospital has <100 beds (=1)	1228	0.37		0.34	0.36
Hospital has 100-299 beds	1228	0.45		0.47	0.47
Hospital Inpatient Mortality Rate (000's)	1149	0.001	0.004	0.001	0.001
Hospital Discretionary Procedure Rate (000's)	1214	0.076	0.053	0.071	0.073
Hospital Surgical Complication Rate (000's)	1169	0.032	0.027	0.031	0.030

Table 4: Transitions in Hospital-Physician Organizational Integration 1994-98*

Change From	Change to					
	Not Integrated	Independent Practice Association	Open Physician Hospital Organization	Closed Physician Hospital Organization	Fully Integrated Organization	Total
Not Integrated	257 (0.30)	15 (0.02)	26 (0.03)	19 (0.02)	50 (0.06)	367 (0.42)
Independent Practice Association	15 (0.02)	60 (0.07)	3 (0.00)	2 (0.00)	9 (0.01)	89 (0.10)
Open Physician Hospital Organization	18 (0.03)	4 (0.00)	125 (0.14)	9 (0.01)	7 (0.01)	163 (0.19)
Closed Physician Hospital Organization	8 (0.01)	3 (0.00)	10 (0.01)	75 (0.09)	6 (0.01)	102 (0.12)
Fully Integrated Organization	37 (0.04)	9 (0.01)	3 (0.00)	2 (0.00)	99 (0.11)	150 (0.17)
Total	335 (0.38)	91 (0.10)	167 (0.19)	107 (0.12)	171 (0.17)	871 (1.00)

*Total Number of Off Diagonal Changes =255

Table 5: Markov Transition Model of Organizational Adoption (N=871)

	Transition to			
	IPA	**Open PHO**	**Closed PHO**	**Fully Integrated**
Lagged Managed Care Penetration in County in Which Hospital is Located	7.29* (4.74)	-1.65 (2.89)	0.73 (4.01)	-1.16 (3.52)
Lagged Change in Managed Care Penetration in County in Which Hospital is Located	15.77* (9.05)	-5.75 (14.82)	17.35*** (6.64)	12.59 (8.00)
Lagged Managed Care Share of Hospital's Patients	-6.01 (4.82)	5.60*** (2.03)	0.37 (3.06)	-0.64 (2.35)
Lagged Average Cost Per Patient Day	-306 (211)	-3243 (88.21)	-18.87 (61.53)	-412.82* (216.32)
Lagged Change in Average Cost Per Patient Day	355 (242)	121.41 (189.67)	-106.25 96.64))	536.08 (326.85)
County Hospital Wage Index	-0.01* (0.01)	0.00 (0.01)	-0.01 (0.00)	0.00 (0.00)
Hospital is located in a MSA (=1)	0.68 (0.87)	0.97 (1.05)	0.89 (1.09)	-0.01 (0.89)
Teaching Hospital (=1)	0.00 0.00	0.48 (0.98)	-0.22 (0.80)	1.82** (0.82)
Small Hospital with Less Than 100 Beds (=1)	-0.81 (0.99)	1.69 (1.57)	-1.42* (0.83)	-0.49 (0.98)
Medium Size Hospital with 100-299 Beds (=1)	-2.06** (0.99)	1.58 (1.02)	-0.86 (0.59)	0.78 (0.81)
For Profit Hospital (=1)	0.25 (0.83)	-1.19 (0.96)	0.10 (0.75)	-42.39*** (0.56)
Transition From Independent Practice Assc. (=1)	0.00 0.00	0.79 (1.21)	0.03 (0.82)	1.40** (0.66)
Transition From Open PHO (=1)	0.28 (0.98)	0.00 0.00	-0.17 (0.69)	-0.99 (1.12)
Transition From Closed PHO (=1)	0.61 (1.04)	1.96* (0.89)	0.00 0.00	0.42 (0.70)
Transition From Fully Integrated Organization (=1)	1.30* (0.72)	0.24 (1.15)	-0.90 (0.83)	0.00 0.00
Constant	13.29 (1.56)	-1.15 (7.24)	3.28 (4.25)	-4.01 (5.47)

Notes: Standard errors are in parentheses. The symbol * indicates that the estimated coefficient is significantly different from zero at 10% level, ** indicates the coefficient is significant at 5% level, and *** signifies significance at 1% level; For the Fully Integrated option, the F-Statistic for the joint significance of the three managed care variables is 3.08 and is not significant at the 10% level.

Table 6: Hospital Cost Functions (N=1093)

	Whole Sample		Excluding Hospitals Already Integrated		Excluding Hospitals That Disintegrated	
	$\ln\left(\frac{\text{Cost}}{\text{Day}}\right)$	$\ln\left(\frac{\text{Cost}}{\text{Patient}}\right)$	$\ln\left(\frac{\text{Cost}}{\text{Day}}\right)$	$\ln\left(\frac{\text{Cost}}{\text{Patient}}\right)$	$\ln\left(\frac{\text{Cost}}{\text{Day}}\right)$	$\ln\left(\frac{\text{Cost}}{\text{Patient}}\right)$
Independent Practice Association (=1)	0.016 (0.016)	0.015 (0.016)	0.004 (0.017)	0.008 (0.018)	0.025 (0.025)	0.024 (0.025)
Open Physician Hospital Organization (=1)	0.017 (0.014)	0.01 (0.014)	0.018 (0.016)	0.02 (0.016)	0.001 (0.024)	0.006 (0.024)
Closed Physician Hospital Organization (=1)	0.000 (0.014)	0.01 (0.014)	-0.014 (0.016)	-0.016 (0.014)	0.015 (0.022)	0.013 (0.022)
Fully Integrated Organization (=1)	-0.006 (0.013)	-0.01 (0.013)	-0.006 (0.013)	-0.003 (0.013)	0.003 (0.018)	0.006 (0.017)
ln (Indemnity Patients or Days)	-0.129** (0.057)	-0.108** (0.051)	-0.132** (0.057)	-0.132** (0.052)	-0.194** (0.080)	-0.135* (0.077)
ln (Managed Care Patients or Days)	0.017* (0.009)	0.034*** (0.010)	0.015* (0.009)	0.030*** (0.010)	0.028** (0.012)	0.047*** (0.013)
ln (Other Patients or Days)	-1.18*** (0.17)	-0.956*** (0.188)	-1.27*** (0.17)	-0.939*** (0.205)	-1.28*** (0.273)	-0.925*** (0.289)
ln (Indemnity Patients or Days)^2	-0.004 0.004	0.003 (0.004)	-0.004 0.004	0.005 (0.004)	-0.008 0.005	0.005 (0.006)
ln (Managed Care Patients or Days)^2	-0.003** (0.001)	-0.007*** (0.02)	-0.003*** (0.001)	-0.007*** (0.002)	-0.006*** (0.002)	-0.010*** (0.002)
ln (Other Patients or Days)^2	0.038*** (0.009)	0.038*** (0.012)	0.043*** (0.009)	0.037*** (0.013)	0.042*** (0.014)	0.034* (0.018)
ln (Average Length of Stay)	-0.010 (0.056)	0.044*** (0.012)	-0.009 (0.044)	0.043*** (0.012)	-0.019 (0.016)	0.046*** (0.012)
Managed Care Patient Case Mix Index	-0.017* (0.010)	-0.006* (0.041)	-0.010* (0.010)	-0.002* (0.010)	-0.008* (0.012)	0.009 (0.011)
Indemnity Patient Case Mix Index	0.033 (0.067)	0.071* (0.041)	0.053 (0.044)	-0.020* (0.041)	0.060 (0.064)	0.038 (0.069)
Other Patient Case Mix Index	-0.013 (0.012)	0.013 (0.012)	-0.122* (0.064)	0.110 (0.068)	-0.016 (0.092)	-0.008 (0.096)
Market Hospital Wage Index	0.00 (0.00)	0.00*** (0.00)	0.00 (0.00)	0.00*** (0.00)	0.00 (0.00)	0.00*** (0.00)
Constant	15.44*** (0.880)	13.92*** (0.751)	15.73*** (0.880)	13.74*** (0.817)	16.02*** (1.29)	13.82*** (1.15)
Test of Year*State Fixed Effects P-Value	.00***	.00***	.00***	.00***	.00***	.00***
Hausman Test P=Value	.00***	.00***	.00***	.00***	.00***	.00***
Test of Hospital Fixed Effects P-Value	.00***	.00***	.00***	.00***	.00***	.00***
Sample Size	1093	1093	987	987	653	653

Notes: Standard errors are in parentheses. The symbol * indicates that the estimated coefficient is significantly different from zero at 10% level, ** indicates the coefficient is significant at 5% level, and *** signifies significance at 1% level. The outputs variables are measured as patient days in the cost per day models and as patients in the cost per patient models.

Table 7: Fixed-Effects Managed Care Prices and Patients Models

	Price Per Day			ln (Patients)	
	(1)	(2)	(3)	(1)	(2)
Independent Practice Association	11 (53)	1 (80)		0.02 (0.07)	0.01 (0.10)
Open Physician Hospital Organization	93** (41)	85 (78)	89** (39)	0.14** (0.06)	0.16 (0.11)
Closed Physician Hospital Organization	82** (43)	372*** (106)	368*** (101)	0.19*** (0.06)	0.13 (0.16)
Fully Integrated Organization	-25 (43)	-31 (71)		0.06 (0.06)	0.09 (0.09)
Market Hospital Wage Index	-0.01 (0.31)	0.10 (0.31)	0.08 (0.30)	0.00 (0.00)	0.00 (0.00)
Managed Care Penetration in County	-424 (386)	-481 (387)	-474 (382)	4.20*** (0.54)	4.23*** (0.54)
(Independent Practice Association) (Profit		-98 (117)			0.17 (0.13)
(Open Physician Hospital Organization) (Profit		3 (96)			-0.20 (0.14)
(Closed Physician Hospital Organization) (Profit		-205** (86)	-193** (77)		-0.18 (0.12)
(Independent Practice Association) (MSA		78 (106)			0.08 (0.15)
(Open Physician Hospital Organization) (MSA		1 (93)			0.02 (0.13)
(Closed Physician Hospital Organization) (MSA		-255** (112)	-264** (105)		-0.10 (0.16)
(Fully Integrated Organization)(MSA		9 (85)			-0.04 (0.11)
Constant	1401*** (388)	1256*** (389)	1278*** (386)	4.76*** (0.55)	4.71*** (0.55)
Joint Test of Year*State Fixed Effects P-Value	.00***	.00***	.00***	.00***	.00***
Hausman Test P-Value	.00***	.00***	.00***	.00***	.00***
Joint Test of Hospital Fixed Effects P-Value	.00***	.00***	.00***	.00***	.00***
Number of Observations	880	880	880	951	951

Notes: Standard errors are in parentheses. The symbol * indicates that the estimated coefficient is significantly different from zero at 10% level, ** indicates the coefficient is significant at 5% level, and *** signifies significance at 1% level.

Table 8: Fixed-Effects Indemnity Prices and Patients Models

	Price Per Day			Ln (Patients)	
	(1)	(2)	(3)	(1)	(2)
Independent Practice Association	58 (62)	3 (85)		-0.01 (0.06)	0.12 (0.08)
Open Physician Hospital Organization	161*** (53)	34 (90)		-0.00 (0.05)	-0.03 (0.09)
Closed Physician Hospital Organization	128*** (53)	263** (108)	245** (103)	0.07 (0.05)	-0.11 (0.11)
Fully Integrated Organization	86* (52)	33 (71)		-0.05 (0.05)	0.03 (0.07)
Market Hospital Wage Index	0.50 (0.41)	0.38 (0.40)	0.36 (0.40)	0.00 (0.00)	0.00 (0.00)
Managed Care Penetration in County	-58 (463)	-56 (459)	-15.6 (456)	-1.45*** (0.44)	-1.38*** (0.44)
(Independent Practice Association) (Profit		-99 (134)			-0.18 (0.13)
(Open Physician Hospital Organization) (Profit		596*** (121)	632*** (106)		-0.14 (0.13)
(Closed Physician Hospital Organization) (Profit		363*** (124)	395*** (110)		-0.16 (0.11)
(Independent Practice Association) (MSA		171 (123)			-0.18 (0.12)
(Open Physician Hospital Organization) (MSA		21 (111)			0.06 (0.11)
(Closed Physician Hospital Organization) (MSA		-240** (121)	-280** (112)		0.15 (0.12)
(Fully Integrated Organization)(MSA		46 (95)			-0.13 (0.09)
Constant	1294** (511)	1447*** (504)	1473 (503)	7.28** (0.50)	7.23*** (0.50)
Hausman Test P-Value	.00***	.00***	.00***	.00***	.00***
Joint Test of Hospital Fixed Effects P-Value	.00***	.00***	.00***	.00***	.00***
Joint Test of Fixed Effects P-Value	.00***	.00***	.00***	.00***	.00***
Number of Observations	1059	1059	1059	1113	1113

Notes: Standard errors are in parentheses. The symbol * indicates that the estimated coefficient is significantly different from zero at 10% level, ** indicates the coefficient is significant at 5% level, and *** signifies significance at 1% level.

Table 9: Estimated Percentage Changes in Managed Care Prices and Volumes

		Prices		Volume
		NonProfit	For-Profit	For & NonProfit
Open Physician Hospital Organization	NonMSA	.06** (.03)	.06** (.03)	.14*** (.06)
	MSA	.06** (.03)	.06** (.03)	.14*** (.06)
Closed Physician Hospital Organization	NonMSA	.26*** (.07)	.13** (.06)	.19*** (.06)
	MSA	.07** (.04)	.04 (.04)	.19*** (.06)

Notes: Standard errors are in parentheses. The symbol * indicates that the estimated coefficient is significantly different from zero at 10% level, ** indicates the coefficient is significant at 5% level, and *** signifies significance at 1% level.

Table 10: Estimated Percentage Changes in Indemnity Prices and Volumes

		Prices		Volume
		NonProfit	For-Profit	For & NonProfit
Open Physician Hospital Organization	NonMSA	0	.18*** (.05)	0
	MSA	0	.18*** (.05)	0
Closed Physician Hospital Organization	NonMSA	.11*** (.05)	.29*** (.06)	0
	MSA	0	.16*** (.05)	0

Notes: Standard errors are in parentheses. The symbol * indicates that the estimated coefficient is significantly different from zero at 10% level, ** indicates the coefficient is significant at 5% level, and *** signifies significance at 1% level.

Table 11: Quality Measures for Managed Care Patients

	Utilization		Surgical Complication		Mortality		ACSC	
	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
Independent Practice Association	.0010 (.0040)		-.0031 (.0022)		-.0010 (.0009)		.0196 (.0123)	
Open Physician Hospital Organization	-.0034 (.0022)	-.0001 (.0037)	-.0017 (.0021)	.0000 (.0023)	.0004 (.0004)	.0002 (.0004)	-.0004 (.0080)	-.0010 (.0077)
Closed Physician Hospital Organization	-.0018 (.0024)	-.0071 (.0051)	-.0053*** (.0019)	.0008 (.0041)	.0001 (.0006)	-.0002 (.0014)	-.0005 (.0076)	-.0076 (.0118)
Fully Integrated Organization	.0007 (.0026)	.0010 (.0036)	-.0043*** (.0016)	-.0034** (.0015)	.0004 (.0005)	.0005 (.0005)	-.0064 (.0058)	-.0107** (.0048)
Market Hospital Wage	.0000 (.000)	.0000 (.000)	.0000 (.000)	.0000* (.000)	-.0000 (.000)	.0000 (.0000)	-.0000 (.000)	-.0000 (.000)
Managed Care Penetration		-.0103 (.0249)		.0099 (.0195)	-.0074 (.0043)	-.0073* (.0042)	-.0763 (.0705)	.0669 (0717)
(Open Physician Hospital Organization)((For-Profit)		.0003 (.0051)		-.0038 (.0039)		.0015 (.0012)		-.0167 (.0136)
(Closed Physician Hospital Organization)((For-Profit)		-.0016 (.0038)		-.0015 (.0045)		.0035** (.0016)		-.0048 (.0125)
(Closed Physician Hospital Organization)(MSA		-.0044 (.0052)		-.0047 (.0041)		-.0001 (.0014)		.0020 (.0131)
Constant	-.0074* (.039)	-.0063 (.0040)	.1931*** (.0092)	.2050*** (.0210)	.0025** (0011)	.0069** (0082)	.2169*** (.0275)	.2162*** (.0278)
Observations (1000s)	93	93	401	401	131	131	370	370

Notes: ACSC stand for ambulatory care sensitive condition. Standard errors are in parentheses. The symbol * indicates that the estimated coefficient is significantly different from zero at 10% level, ** indicates the coefficient is significant at 5% level, and *** signifies significance at 1% level.

Table 12: Quality Measures for Indemnity Patients

	Utilization		Surgical Complication		Mortality		ACSC	
	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
Independent Practice Association	.0012 (.0011)		-.0053 (.0036)		.0010 (.0010)		.0057 (.0111)	
Open Physician Hospital Organization	-.0004 (.0007)	-.0005 (.0007)	-.0036 (.0021)	-.0043 (.0026)	.0005 (.0005)	.0003 (.0006)	.0026 (.0054)	.0027 (.0052)
Closed Physician Hospital Organization	.0003* (.0006)	.0004 (.0019)	-.0048** (.0016)	-.0070 (.0050)	-.0005 (.0004)	-.0012 (.0008)	.0020 (.0047)	-.0150 (.0092)
Fully Integrated Organization	-.0015** (.0007)	-.0015** (.0007)	-.0037** (.0018)	-.0030* (.0017)	-.0000 (.0005)	-.0001 (.0005)	-.0063 (.0047)	-.0050 (.0042)
Market Hospital Wage	.0000 (.000)	.0000 (.000)	.0000 (.000)	.0000 (.000)	.0000 (.000)	.0000 (.0000)	.0000 (.000)	.0000 (.000)
Managed Care Penetration	-.0135 (.0084)	-.0136* (.0080)	-.0087 (.0124)	-.0049 (.0139)	.0004 (.0041)	.0007 (.0042)	-.0641 (.0465)	-.0415 (.0474)
(Open Physician Hospital Organization)((For-Profit)		-.0013 (.0016)		-.0049 (.0066)		.0006 (.0017)		-.0186 (.0131)
(Closed Physician Hospital Organization)((For-Profit)		-.0043* (.0023)		.0065 (.0040)		.0002 (.0014)		-.0343** (.0147)
(Closed Physician Hospital Organization)(MSA		.0003 (.0020)		.0024 (.0052)		-.0006 (.0009)		.0244** (.0104)
Constant	-.0148*** (.0049)	-.0179*** (.0067)	.0078 (.0129)	.0785*** (.0011)	-.0007 (0011)	-.0021* (.0011)	.3363*** (.0333)	.3282 (.0337)
Observations (1000s)	577	577	242	242	83	83	210	210

Notes: ACSC stand for ambulatory care sensitive condition. Standard errors are in parentheses. The symbol * indicates that the estimated coefficient is significantly different from zero at 10% level, ** indicates the coefficient is significant at 5% level, and *** signifies significance at 1% level.

Table 13: Fixed Effects Estimates of Charity Care Models (N=1168)

	Ln (Charity Days)	Ln (Charity Discharges
Independent Practice Association	0.09 (0.13)	0.07 (0.13)
Open Physician Hospital Association	-0.08 (0.10)	-0.03 (0.10)
Closed Physician Hospital Association	-0.11 (0.12)	-0.04 (0.10)
Fully Integrated Organization	0.23** (0.11)	0.15* (0.10)
Market Hospital Wage Index	-0.00** (0.00)	-0.00** (0.00)
Managed Care Penetration in County	-2.17** (1.00)	-2.21** (.85)
Constant	8.95 (-547)	7.19*** (0.97)
Joint Test of Year*State Fixed Effects P-Value	.00***	.00***
Hausman Test P-Value	.00***	.00***
Joint Test of Fixed Effects P-Value	.00***	.00***

Notes: Standard errors are in parentheses. The symbol * indicates that the estimated coefficient is significantly different from zero at 10% level, ** indicates the coefficient is significant at 5% level, and *** signifies significance at 1% level.