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Hospital Mergers and Competitive Effects: Two Retrospective Analyses

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ABSTRACT *We present empirical analyses of the effects of two hospital mergers – both occurring in the northern suburbs of Chicago in 2000 – on the pre- and post-merger prices negotiated with commercial health insurers. Using difference-in-differences methodology and data on actual transaction prices, specifically the prices paid by private health insurance companies and patients for inpatient care, we find one of the mergers was anticompetitive. Relative to price increases at other hospitals, the merger between Evanston Northwestern and Highland Park Hospitals led to large and statistically significant post-merger price increases. Our results are robust across data sources, control groups, and case-mix adjustment methods.*

Key Words: Hospital Mergers; Competition in Markets for Health Care Services; Antitrust Policy.

JEL classifications: I11, L41, L44.

1. Introduction

In 2002, the Federal Trade Commission (FTC) announced the Hospital Merger Retrospectives Project – a study of consummated hospital mergers to foster a better understanding of competition in markets for hospital services and the effects of hospital mergers. The main objectives of the Hospital Merger Retrospectives Project were to allow the Commission to "consider bringing enforcement actions against consummated, anticompetitive hospital mergers" and "to update

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[the Commission's] prior assumptions about the consequences of particular transactions and the nature of competitive forces in health care".[1]

The need for renewed study of hospital competition and new approaches to antitrust enforcement in markets for hospital services was clear. In fact, the FTC's retrospective project followed a series of seven straight unsuccessful hospital merger challenges made by the FTC, the Department of Justice, and California's Attorney General in the mid-to-late 1990s.

This paper summarizes the findings on two consummated mergers – both of which occurred in 2000 at hospitals located in the northern suburbs of Chicago. In January 2000, Evanston Northwestern Healthcare Corporation with its flagship teaching hospital in Evanston and a community hospital in Glenview merged with Highland Park Hospital, a nearby community hospital (the Evanston merger). Then in February 2000, two community hospitals located in Waukegan, Illinois, merged to form Vista Health (the Vista Health merger).[2]

Ultimately, only one of these hospital consolidations was found to be anticompetitive.[3] In February 2004, the FTC issued an administrative complaint challenging the Evanston merger under Section 7 of the Clayton Act. After a trial in 2005, the administrative law judge ruled the Evanston merger gave the combined entity the ability to raise prices through the exercise of market power, and this decision was upheld by the Commission on appeal in 2007.[4] The FTC closed its investigation of the Vista Health merger after finding little evidence of anticompetitive effects.[5]

In this paper, we estimate the effects of the Evanston and Vista Health hospital mergers on the prices paid by private health insurance companies for inpatient hospital services.[6] More specifically, we estimate the post-merger price changes at the merged hospitals relative to control hospitals. In addition, our empirical model controls for changes in other factors that vary over time and across hospitals (e.g., patients' severity of illness).

The empirical results suggest that the Evanston merger enhanced the merged hospitals' market power, as defined in the 1992 Horizontal Merger Guidelines. Specifically, the Guidelines define a seller's market power as "the ability profitably to maintain prices above competitive levels for a significant period of time". We find large and statistically significant relative post-merger price increases for all but one of the commercial insurers. These price-increase estimates are robust to different control groups and case mix adjustments and are consistent with the price increases estimated using other data sources. The empirical results for the Vista Health merger, however, confirm not all hospital mergers enhance market power.

Mergers of competing hospitals may result in higher or lower hospital prices, and thus the price effect of any particular hospital merger is an empirical issue. Only a small number of papers analyze the price effects of hospital mergers retrospectively. Vita and Sacher (2001) found that the merger of two nonprofit Santa Cruz, California hospitals led to a significant price increase. Capps and Dranove (2004) studied a dozen mergers of competing hospitals in the late 1990s and found that three-quarters of the mergers resulted in price increases greater than the median price increase in their sample. Dafny (2009) and Krishnan (2001) also retrospectively studied hospital mergers and found that mergers of competing hospitals increase prices on average.

Our results (like the companion studies from the Hospital Merger Retrospectives Project – Tenn, 2008; and Thompson, 2009) are of particular interest because

they are based on the actual prices paid by multiple commercial insurers to hospitals. Claims data were collected directly from seven commercial insurers. Previously, only Capps and Dranove (2004) used actual prices to examine the impact of hospital mergers, but their data include the prices negotiated with only one insurer. Because hospitals tend not to publicize results of their negotiations with commercial insurers (or how much they are actually paid for their services), most studies are based on estimates derived from publicly available lists of hospital charges. Charges tend to be higher than the rates negotiated with commercial insurers.

There is also a fairly large literature that analyzes the cross-sectional relationship between competition and hospital pricing. Haas-Wilson (2003) surveys this literature and concludes

> Although these studies used differing product and geographic market definitions and differing research methods, the consistency of their results is striking. Since the introduction of selective contracting between insurers and hospitals in the mid-1980s, increased concentration in markets for hospital services has been associated with higher prices for those services. (p. 157)

Melnick and Keeler (2007) and Dranove *et al.* (2008) also find that reductions in hospital competition lead to higher prices, although the latter paper finds this relationship has diminished slightly in recent years.

The paper is structured as follows. Section 2 provides background information on selective contracting by commercial insurers. Section 3 describes the methods and econometric model used to estimate the price changes. Section 4 describes the data. Section 5 describes the resulting estimates, including payer-by-payer estimates of the relative price change at each of the combined hospitals. Section 6 concludes.

2. Negotiations between Commercial Insurers and Hospitals

Each hospital or hospital system negotiates the terms of its contract with commercial insurers. These contract terms determine the rates and actual prices paid for hospital services by commercial insurers and the patients enrolled in commercial insurance plans. Some hospitals and insurers renegotiate their contracts on an annual basis; others have multiple-year contracts.

Hospital charges, on the other hand, are set unilaterally by the hospital. Typically the hospital's "chargemaster" lists the hospital's suggested charge for the use of its operating rooms and ICUs, diagnostic tests and other ancillary services, medical devices, drugs, and other items.

"Selective contracting" is the term used to describe a contracting strategy in which health insurers simultaneously select hospitals or hospital systems for inclusion in their plans' provider networks and negotiate the contract terms. By selectively contracting, commercial insurers try to negotiate more favorable contract terms with health-care providers. More favorable contract terms allow insurers to pay prices that are below the hospital's charges (also called the hospital's "list prices"). Because the insurer may not contract with all the hospitals in an area, the insurer can offer a higher volume of patients to hospitals in return for lower prices from those hospitals.

The extent of selective contracting by health insurers varies across geographic areas (Ho, 2009). In some areas, such as San Antonio, Texas and Atlanta, Georgia, little selective contracting is observed – all five of the largest HMO plans (by enrollment) contract with all eight of the largest hospitals (by admissions). In other geographic areas, such as Portland, Oregon and New Orleans, however, four or more of the largest plans exclude at least one of the largest hospitals from their networks.

The contracts negotiated between commercial insurers and hospitals vary across insurers, products offered by the insurer (e.g., PPO, HMO, etc.), and hospitals. These contracts between insurers and hospitals fulfill multiple purposes, including (1) setting the rates and pricing mechanisms to be used in the determination of the actual prices insurers will pay for hospital services; (2) setting forth the extent and the procedures for the insurer to monitor and control the hospital utilization of its enrollees, such as pre-approval, treatment guidelines, and retrospective review; and (3) spelling out the details of the billing arrangement between the hospital and insurer. For example, the contract may contain a clause that prohibits the hospital from "balance billing" enrollees, billing the enrollees for the difference between a hospital's list prices and its negotiated prices.

Contracts between commercial insurers and hospitals use a variety of rates, including negotiated per diem and case rates, and a variety of pricing mechanisms, including negotiated discounts-off charges, to determine the actual prices paid for inpatient hospital services. These contracts often include different rates and pricing mechanisms for different types of illnesses or procedures. For example, a contract may stipulate cardiac cases be paid on the basis of per diem rates and obstetric cases be paid on the basis of case rates. In addition, these contracts may include agreed-upon stop-loss provisions that modify the pricing mechanisms for outlier hospital stays.

Accordingly, hospitals may raise their actual prices for inpatient care in multiple ways, including changing their pricing methodologies, increasing their charges, and negotiating higher rates and/or lower discounts-off billed charges with commercial insurers.

2.1 Selective Contracting and Hospitals' Market Power

Selective contracting may stimulate competition among hospitals (and other types of health-care providers, such as physicians) vying for inclusion in insurers' provider networks. A key factor in an insurer's ability to extract price discounts from hospitals is the insurer's ability to shift its enrollees from one hospital to another. Likewise, a hospital's ability to negotiate higher prices from insurers is directly related to the extent to which there are substitutes for that hospital.

A hospital's bargaining position, and thus a hospital's ability to negotiate higher prices with insurers, depends on its incremental value to an insurance plan's network.[7] A hospital adds value to an insurance plan's network when individuals highly value insured access to that hospital and there are no close substitutes for that hospital. Prospective hospital patients have heterogeneous preferences, and thus some value most highly insured access to the hospital closest to their homes, while others prefer insured access to the hospital affiliated with a prestigious medical school. When enough individuals have a strong preference for a particular hospital (or hospital system), that hospital obtains

"must-have" status – recognition by insurers that, without a particular hospital in their provider networks, their insurance plans would be at a competitive disadvantage in the market for health-care financing.

A particular hospital's incremental value to the provider network depends, in part, on the extent to which other hospitals are good substitutes for it. A hospital may have no close substitutes because each hospital (or hospital system) offers a differentiated product. A hospital is differentiated by its geographic location, quality of care, reputation, range of services and technologies, teaching program, religious affiliation, amenities, and other factors.

A hospital will be able to negotiate higher prices with insurers in proportion to the degree to which its withdrawal from the network decreases enrollees' willingness to pay for insured access to the remaining hospitals in the network. If the hospital has a close substitute (in the minds of the enrollees) and the substitute hospital remains in the network, then its withdrawal will have a minor effect on enrollees' willingness to pay for the network. In other words, the threat of withdrawal may not lead to significantly higher negotiated prices. If, however, a hospital has no close substitutes, then the threat of withdrawal from the network may lead to significantly higher negotiated prices for the hospital.

The results of a study by the Massachusetts Attorney General (2010) provide support for the hypothesis that hospitals with no close substitutes are able to negotiate higher prices with insurers. Specifically, this study found that the wide variation in prices paid by insurers for the same or similar hospital services in Massachusetts is correlated with a hospital's market leverage – the relative market position of the hospital compared with other hospitals within a geographic region. "Typically, leverage results from variables such as: size, geographic location, 'brand name,' and/or niche or specialty service lines offered … Large health care providers have a great deal of leverage in negotiations because insurers must maintain stable, broad provider networks" (p. 28).

3. Methods

Typically, the Department of Justice (DOJ) or the FTC challenges a merger after it has been proposed but before it has been consummated. These "prospective" challenges require predictions about the future competitive effects of the proposed merger. Mergers are only illegal if they are likely to lessen competition substantially. Since the prospective merger has not yet taken place, one cannot show that the merger has lessened competition. Rather, one can only predict whether it is likely to lessen competition. In prospective cases, proxies for future market power (such as changes in market share and concentration in a well-defined market) are used to assess the likely impact of the merger on prices and other aspects of conduct, and thus consumers, in the future.

In contrast, our results are based on a retrospective study of two consummated hospital mergers – the Evanston and Vista Health mergers. Instead of using structural factors, such as changes in market share and concentration, to predict the effects of these mergers, we directly measure their competitive effects. In this retrospective analysis, the questions we address are whether the merging parties obtained or enhanced market power through their mergers, and if so, whether they exercised that market power in their negotiations with commercial insurers by negotiating higher post-merger prices. The econometric analyses are designed to determine whether the merged entity received higher prices than the

merging hospitals would have received if the merger had not occurred, and if so, whether the price increases were due to an increase in market power associated with the merger.

To test the hypotheses that the merged hospitals obtained or enhanced their market power as a result of the Evanston or Vista Health mergers, we examine price changes, rather than price levels. In a market with differentiated products, different price levels are neither necessary, nor sufficient, to demonstrate the exercise of market power. Established models of monopolistic competition show differentiated products will sell at different prices at the same point in time, even in the long run when economic profits are zero. That Hospital A negotiates higher prices for its services than Hospital B at one point in time is not necessarily evidence of the exercise of market power by Hospital A. If it costs more for Hospital A to provide its services at its location than it costs Hospital B to provide its services at its location, Hospital A will have to have higher prices than Hospital B in equilibrium.

Large post-merger increases in a hospital's prices, on the other hand, suggest that the merger may have created or enhanced that hospital's market power. Accordingly, as a first step, we used data provided by the hospitals to calculate insurer-specific price increases following the mergers. These estimates of price increases per case of inpatient hospital care do not control for changes in case mix at the merging hospitals over time. The pre-merger price is based on data from fiscal year 1999 (October 1, 1998, to September 30, 1999) and the post-merger price is based on 11 months of data from fiscal year 2002 (October 1, 2001, to August 31, 2002).

The results in Table 1 suggest that many commercial insurers were forced to pay much higher prices per case of inpatient care at the Evanston hospitals following that merger. Two commercial insurers experienced price increases >100%, and another seven insurers experienced price increases >75%. Similar results were found using prices per day of inpatient care. Across all commercial insurers,[8] the hospitals involved in the Evanston merger increased price per case by almost 50% between 1999 and 2002, greatly exceeding the increase in the national hospital inflation measures and the local medical care CPI.[9] Following the Vista Health merger, some insurers experienced increases in price per case, but others experienced decreases, so that overall, prices at the merged hospital increased by 4% between 1999 and 2002.

The large post-merger price increases at the Evanston hospital, however, are consistent with at least three hypotheses: (1) the Evanston merger in 2000 created or enhanced the hospital's ability to raise its prices for general acute inpatient services; (2) between 1998 and 2002, there was an increase in the complexity of inpatient cases and/or an increase in patients' severity of illness (and thus an increase in resource intensity and costs) at the Evanston hospitals relative to other hospitals; and (3) between 1998 and 2002, the quality of care improved at the Evanston hospitals relative to other hospitals. In other words, to isolate the impact of a merger, it is necessary to control for the other factors (unrelated to the merger) that may be associated with increases or decreases in hospitals' prices over time.

Changes in the prices negotiated between a hospital and an insurer over time may reflect changes in the quality of the services offered by the hospital. In the Evanston merger, however, this was not the case. Substantial quality evidence was presented at the trial, and the judge found "no evidence of improvement in overall quality of care relative to other hospitals" (2005, p. 173). Further, the

Table 1. Percentage change in inpatient net revenue per case, FY99 to FY02

Payer	ENH/HPH	STMC/VMH
A	88.7%	38.2%
B	57.9%	
C	6.8%	–6.3%
D	130.9%	45.4%
E	81.4%	
F	77.3%	
G	80.1%	–9.2%
H	137.2%	
I	62.3%	0.1%
J	43.6%	
K	99.4%	
L	20.9%	
M	79.9%	13.8%
N	80.3%	
Overall managed care	*49.0%*	*4.0%*

Source: Hospital data.

Commission concluded Evanston "failed to show that quality improved across the combined ENH system and relative to other hospitals".[10] Romano and Balan (2011) provide additional empirical evidence that the Evanston merger did not improve quality. Similarly the Massachusetts Attorney General found that wide variations in hospitals' prices "are unexplained by differences in quality of care as measured by the insurers themselves" (2010, p. 16). Accordingly, our focus was on constructing groups of comparison hospitals and measuring changes in case mix or severity of illness across hospitals and over time.

Comparison with other hospitals controls for changes in prices that would have occurred, even if the merger had not taken place. If other hospitals in the Chicago Primary Metropolitan Statistical Area (PMSA) experienced similarly large price increases, then these price increases were most likely due to exogenous factors that affected all hospitals in the area. Factors that may be associated with price changes at all hospitals in a particular area include changes in the costs and technologies of producing general acute-care inpatient services.

We used multiple control groups of hospitals because hospitals are highly differentiated across many characteristics (some of which are difficult to quantify). The first and broadest control group included all non-federal, general, acute-care hospitals in the Chicago PMSA. The only hospitals excluded from this control group were federal facilities (e.g. VA hospitals), non-pediatric specialty hospitals (e.g. psychiatric hospitals), and long-term care hospitals.

The second control group was based on hospitals' merger status and included only those non-federal, general, acute-care hospitals in the Chicago PMSA that were not involved in mergers between 1996 and 2002.[11]

The third control group focused on teaching status and included only those non-federal, general, acute-care hospitals with teaching programs for the Evanston merger (and those without teaching programs for the Vista Health merger). Teaching hospitals may have different cost structures than non-teaching hospitals. Teaching status was determined in two ways – first, if the hospital had

a residency programs in 2000, and second, if the hospital had more than 0.25 residents and interns per staffed bed between 1998 and 2002. The threshold of 0.25 residents and interns per staffed bed is the threshold set by MEDPAC to identify hospitals with teaching programs.

Because all of these control groups include hospitals in the Chicago PMSA, none control for second-order rival effects – the expectation that in response to a competition-lessening merger, other hospitals in the area may increase their prices as well.

We used two measures of case-specific resource intensity – the first based on Diagnosis Related Group (DRG) weights and the second on All Patient Refined Diagnosis Related Groups (APRDRGs) and measures of severity of illness. The DRG classification system consists of roughly 500 groups of diagnoses. These groups are defined so that, within each group, the resources used to treat patients are similar. This classification system is the basis for the federal government's reimbursement to hospitals for inpatient services under the Medicare program. In particular, each year, the Center for Medicare and Medicaid Services publishes a relative weight for each DRG representing the cost of treating a case in that DRG relative to the cost of treating the average case. For example, in fiscal year 2003, the DRG relative weight for a bone marrow transplant (DRG 481) was 7.13, meaning that a bone marrow transplant used more than seven times the resources of the average inpatient case.[12]

The APRDRG classification system was developed by 3M Health Information Systems and includes approximately 300 groups of diagnoses. Within each APRDRG, each case is ranked from 1 to 4 based on its severity of illness (SOI), with 4 being the most severe. The SOI ranking was developed to mirror resource use.

We also included the patient's length of stay in days as another independent variable in some alternate specifications as another control for severity. Length of stay is not in our primary models because it is endogenous (i.e., since many hospital/insurer contracts specify per day payments, hospitals can increase their price per case by increasing a patient's length of stay, unless there are protections against this in the contract). It is also highly correlated with case mix measures such as DRG weights.

The econometric model we estimate is the following:

$$Price_{\mathrm{i}} = \alpha + \beta_1 Post_{\mathrm{i}} + \beta_2 (Post_{\mathrm{i}})(\mathrm{D_{MH}}) + \beta_3 Casemix_{\mathrm{i}} + \beta_4 Public_{\mathrm{h}} + \beta_5 Teach_{\mathrm{h}} + \beta_6 D + \beta_7 Plan_{\mathrm{i}} + \beta_8 \mathrm{T} + \varepsilon_{\mathrm{i}}$$

where i indexes episodes of inpatient care (i.e., cases) and h indexes hospitals. $Price_{\mathrm{i}}$ is the total allowed amount for case i (expressed in log form);

$Post_{\mathrm{i}}$ is a dummy variable equal to 1 in the post-merger period.

In the MCO data, *Post* is defined specific to each MCO using the effective date of the first post-merger contract (or the merger date if no post-merger contract was signed by December 31, 2002).

In the state data, *Post* = 1 for 2001 and 2002, with year 2000 treated as a transition year and excluded from the data set.

$Casemix_{\mathrm{i}}$ is the measure of case mix: either the DRG weight of the case i (expressed in log form), the set of DRG dummies, or the set of APRDRG/SOI dummies.

As an alternate specification, length of stay (LOS) is also paired with each case-mix measure, producing six methods of controlling for case mix variation.

$Public_h$ is Medicare share + Medicaid share of hospital h (from the Medicare Cost Reports) (expressed in log form), where the public share is matched to the case based on the discharge date.

$Teach_h$ is residents and interns per bed at hospital h (from the Medicare Cost Reports) (expressed in log form), where the teaching intensity is matched to the case based on the discharge date.

D is the vector of hospital dummy variables ($\mathbf{D}_{MH}$ is the dummy variable for the merging hospital in question[13]).

$\mathbf{Plan}_i$ is the vector of dummy variables indicating the patient's plan (PPO, HMO, or Indemnity; only included in the MCO data analysis).

T is the vector of year dummy variables.

Some have argued that hospitals "cost-shift" by subsidizing the care given to Medicare, Medicaid, and indigent patients by charging commercially insured patients more than the cost to treat them, particularly when (or if) public programs like Medicare and Medicaid do not cover the full cost of treating their members. Thus another possible reason for a price change to commercial patients could be a change in the distribution of insurance coverage of a hospital's patients. For instance, if a hospital suddenly sees an increase in the proportion of its patients using Medicare and Medicaid, it may increase its price to commercial insurers to cover its costs or forgone revenues. To control for this possibility, we include Medicare share plus Medicaid share as an independent variable.

We also include residents and interns per staffed bed as an independent variable to capture potential increases in teaching intensity over time that might cause price changes.

The model parameters are estimated using ordinary least squares. The standard errors are estimated using clustered robust Huber/White estimates of variance to address the possibility of cross-hospital heteroskedasticity and within-hospital autocorrelation.[14] In other words, cases from the same hospital may not be independent and the observations from different hospitals, while likely independent, may have error terms which are not identically distributed. We are primarily interested in the estimate of β_2; roughly speaking, the estimate of the difference between the price change at the merging hospital and the average price change across the controls. These estimates are reported in the results below.[15]

4. Data

To estimate the empirical model, we employed two distinct sources of data on hospital prices. The first source is five years (1998 to 2002) of insurance claims from five of the largest insurers in the Chicago area, representing more than 50% of insured enrollees in the Chicago area.[16] In these data, each record is a claim, which roughly corresponds to a procedure or a service (e.g., MRI, pharmacy, surgical procedure, etc.). Each record includes both the billed amount – the list price (also called "billed charges") and the allowed amount – the amount the insurer and patient actually owe the hospital for the procedure or service. As discussed earlier, when insurers negotiate contracts with hospitals, hospitals often agree to accept payments (allowed amounts) that are less than their billed charges. In addition, each record contains patient-specific information, such as the patient's identification number, age, and gender. Each record also includes dates of services, diagnosis codes, and procedure codes.

Based on these claims data, we measured hospital prices as the actual amounts owed (and presumably paid by insurers and patients) per case/episode of inpatient care or inpatient admission.[17]

In order to calculate the allowed amount per case, the payment information contained in each record has to be aggregated up to the level of the case. Separate episodes of inpatient care are identified using the patient's member identification number and the dates of service. For each patient (identified by identification number), the claims with overlapping dates of service (e.g. the beginning date of service for one claim is before the end date of service for another claim) are aggregated into cases of inpatient care.

Next, we used the demographic information (age and gender) and the diagnostic and procedure codes in the claims data to group cases into DRGs and APRDRGs.[18] If, within the records associated with a case, some of this information was internally inconsistent (e.g., some records indicate a male while others indicate a female, or all of the records indicate a male but the diagnosis is an obstetrics diagnosis, etc.), the case was excluded from our sample. As illustrated in Appendix A (Description of Inpatient Claims Data), 11% of the records from Chicago PMSA hospitals are from internally inconsistent cases. Further, an additional 27% of the internally consistent cases had other types of coding errors and were excluded. It is possible that the non-random exclusion of these problematic observations and cases biased the results. If a bias exists, it most likely led to an underestimate of the relative post-merger price increase following the Evanston merger. Unlike the data overall, the observations (i.e. claims) excluded because of internally inconsistent information show a general price decrease, but a larger price decrease at the control hospitals (–71%) than at the merged hospital (–59%). Of the remaining cases, those excluded due to other coding errors show a relatively large price increase for the merged hospital (40%) and a price decrease for the control hospitals (–16%).

The pre- and post-merger periods were delineated for each commercial insurer by the date of its first contract renegotiation after the merger.

As a check on our primary results, we used a second source of data: the Illinois Department of Public Health's Universal Dataset. For each inpatient hospital discharge (case) in the state of Illinois, the Universal Dataset includes demographic, procedural, diagnostic (including DRG), and limited billing information. These data include the total billed amount (i.e. list price) for each case, but not the actual payment information.

In order to approximate the amount actually received by the hospital for each case, we combined the billing information in the Universal Dataset with revenue information taken from Medicare's Hospital Cost Reporting Information System (called the Medicare Cost Reports). The Cost Reports include each hospital's total billed charges (called Gross Revenue) and the hospital's actual payments received after contractual discounts (called Net Revenue).[19] For each inpatient case in the Universal Dataset, we multiplied the billed amount by the ratio of Net Revenue to Gross Revenue associated with that case's hospital and discharge date. In other words, we used information in the Cost Reports to approximate actual prices from the list prices. Other articles examining hospital competition have used this approach to measure prices (e.g. Gaynor and Vogt, 2003).

To summarize, in addition to the post-merger price increases calculated using data obtained directly from the merging hospitals (reported in Table 1), we used two additional sources of data to investigate the post-merger price changes. The

advantage of the insurance claims data is that it contains actual transaction prices. The disadvantage is that a relatively large portion of the data is unusable because of aggregation and consistency issues. The Universal Dataset has none of these issues, but it does not contain actual prices, so transaction prices must be approximated using Cost Report information. As seen in the following section, both of these sets of price change estimates are consistent with the raw price changes calculated from data taken directly from the hospitals.

5. Results

The Evanston merger appears to have increased the ability of the merged hospital to raise its prices. Insurer-specific estimates of price increases at the merged hospital (relative to control hospitals) following the Evanston merger are reported in Table 2.[20] These estimates show that four of the five commercial insurers experienced large and statistically significant price increases at the merged hospital relative to control hospitals. The rows of Table 2 list the commercial insurers[21] and the columns list the six case-mix adjustment methods. Each of the four sections of the table contains the estimated price increases at the merged hospital

Table 2. Estimated post-merger percentage price increase at Evanston Northwestern Healthcare/Highland Park Hospital

Case Mix =	APRDRGSOI	APRDRGSOI w/LOS	DRG	DRG w/LOS	Weights	Weights w/LOS
Control = Chicago PMSA hospitals						
Payer A	23.1***	25.6***	21.0***	25.0***	22.3***	26.0***
Payer B	17.2***	24.0***	18.1***	24.9***	21.3***	25.1***
Payer C	–0.8	–0.9	0.0	–1.0	0.4	–1.4
Payer D	55.7***	62.5***	56.2***	62.7***	58.6***	64.7***
Payer E	11.0***	12.1***	12.3***	14.0***	15.4***	16.0***
Control = Non-merging Chicago PMSA hospitals						
Payer A	35.1***	34.4***	32.7***	33.7***	33.1***	32.7***
Payer B	26.5***	29.2***	30.2***	33.0***	30.1***	30.6***
Payer C	3.8*	1.8	4.3*	1.6	5.5**	1.5
Payer D	64.9***	74.5***	65.5***	74.8***	68.9***	79.9***
Payer E	20.1***	20.5***	21.9***	23.1***	28.0***	28.4***
Control = Chicago PMSA teaching hospitals						
Payer A	24.9***	26.3***	22.7***	25.9***	24.0***	26.9***
Payer B	16.3***	23.9***	17.3***	24.8***	20.2***	24.3***
Payer C	–0.8	–1.4	0.1	–1.4	0.3	–1.8
Payer D	50.1***	56.3***	49.4***	56.1***	51.2***	57.4***
Payer E	12.2***	13.0***	12.9***	14.3***	13.9***	14.4***
Control = Chicago PMSA major teaching hospitals						
Payer A	30.4***	29.6***	28.5***	29.7***	29.0***	29.9***
Payer B	17.8***	25.8***	18.6***	26.6***	20.2***	24.1***
Payer C	0.2	–2.1	1.1	–2.1	1.4	–2.5
Payer D	48.7***	55.7***	46.7***	54.0***	48.0***	56.2***
Payer E	15.2*	15.1*	16.1*	16.6*	14.5	14.3

Source: MCO data. Significance level: ***1%; **5%; *10%.

relative to hospitals in one of the four control groups – all general acute-care hospitals in the Chicago PMSA, general acute-care hospitals in the Chicago PSMA that did not merge with another hospital between 1996 and 2002, general acute-care hospitals in the Chicago PSMA with some teaching activity (at least one intern or resident between 1998 and 2002), and general acute-care hospitals in the Chicago PSMA with major teaching activity (at least 0.25 residents and interns per staffed bed between 1998 and 2002).[22]

Following the Evanston merger, four of the five commercial insurers were forced to raise their prices by at least 10 percentage points more at the merged hospital relative to other Chicago area hospitals. Payer D experienced the largest relative price increase, in excess of 50 percentage points. These results are highly robust to different control groups and case-mix adjustment methods. Only Payer C was able to negotiate similar (not significantly different than) price increases at the merged hospital relative to control hospitals.

The Evanston merger enhanced the hospital's market power, but unevenly across commercial insurers. This result is consistent with the literature showing variation in health insurers' abilities to negotiate price discounts with hospitals (Wu, 2009). Interestingly, the commercial insurer with the largest absolute percentage increase in price at Evanston hospital (Payer D) also experienced the largest increase in case-mix adjusted price at Evanston relative to other hospitals in the Chicago PSMA.

In contrast, following the Vista Health merger, the relative price change at the merged hospital was most often less, as seen in Table 3. Three of the five commercial insurers (Payers B, C, and E) experienced relatively smaller price increases at the merged hospital (relative to control hospitals). Only one commercial insurer

Table 3. Estimated post-merger percentage price increase at St. Therese Medical Center/Victory Memorial Hospital

Case Mix =	APRDRGSOI	APRDRGSOI w/LOS	DRG	DRG w/LOS	Weights	Weights w/LOS
Control = Chicago PMSA hospitals						
Payer A	6.1**	4.0	6.1**	4.4*	6.6***	3.8
Payer B	–15.6***	–20.8***	–14.3***	–20.0***	–13.1***	–19.2***
Payer C	–6.7***	–6.2***	–6.9***	–6.1***	–6.4***	–7.7***
Payer D	18.9***	17.3***	18.8***	19.9***	21.6***	19.8***
Payer E	–21.7***	–22.5***	–21.1***	–21.9***	–18.0***	–18.2***
Control = Non-merging Chicago PMSA hospitals						
Payer A	10.7***	8.7***	10.9***	9.5***	10.3***	7.0***
Payer B	–11.6***	–16.9***	–8.8***	–14.9***	–7.6***	–13.7***
Payer C	–5.4***	–5.3***	–5.6***	–5.3***	–5.0***	–7.0***
Payer D	28.4***	25.0***	25.7***	26.9***	28.1***	26.8***
Payer E	–19.7***	–20.6***	–19.9***	–20.8***	–16.7***	–17.1***
Control = Chicago PMSA community hospitals						
Payer A	4.3	3.6	4.4	3.9	4.3	2.6
Payer B	–16.0***	–19.4***	–14.6***	–18.3***	–11.5**	–15.5***
Payer C	–8.1***	–7.1***	–8.2***	–7.0***	–7.6***	–8.8***
Payer D	26.9***	23.6***	23.2***	26.1***	28.9***	26.9***
Payer E	–20.8***	–21.2***	–22.7***	–22.8***	–17.8***	–17.7***

Source: MCO data. Significance level: ***1%; **5%; *10%.

Table 4. Estimated post-merger percentage price increase at Evanston Northwestern Healthcare/Highland Park Hospital

Case Mix =	APRDRGSOI	APRDRGSOI w/LOS	DRG	DRG w/LOS	Weights	Weights w/LOS
Control = Chicago PMSA hospitals						
All patients	15.5***	16.6***	15.0***	16.5***	14.2***	16.8***
Private pay patients	15.2***	15.7***	15.3***	15.6***	13.7***	14.1***
Control = Non-merging Chicago PMSA hospitals						
All patients	15.1***	15.9***	15.4***	16.0***	14.2***	16.3***
Private pay patients	16.9***	16.4***	17.3***	16.3***	14.7***	13.6***
Control = Chicago PMSA teaching hospitals						
All patients	14.2***	15.0***	13.9***	15.0***	13.1***	15.5***
Private pay patients	13.3***	13.5***	13.7***	13.6***	11.9***	12.0***
Control = Chicago PMSA major teaching hospitals						
All patients	16.7***	16.0***	16.4***	15.9***	15.7***	16.2***
Private pay patients	13.3***	12.1***	14.0***	12.2***	12.0***	10.6***

Source: IDPH and Cost Report data. Significance level: ***1%; **5%; *10%.

(Payer D) experienced a price increase at the merged hospital significantly greater than at other hospitals.

The results using data from the Illinois Department of Public Health's Universal Dataset and Medicare Cost Report are consistent with the estimated price increases using the claims data. The Evanston merger appears to have increased the ability of the merged hospital to raise its prices. Following the Evanston merger (Table 4) the post-merger price increase at the merged hospital was 11 to 17 percentage points greater than the average price increase at control hospitals. This difference is statistically significant and robust to all of the control groups, case mix adjustment methods, and patient populations. Table 5 lists the

Table 5. Estimated post-merger percentage price increase at St. Therese Medical Center/Victory Memorial Hospital

Case Mix =	APRDRGSOI	APRDRGSOI w/LOS	DRG	DRG w/LOS	Weights	Weights w/LOS
Control = Chicago PMSA hospitals						
All patients	–6.8***	–7.5***	–7.2***	–7.4***	–7.3***	–7.5***
Private pay patients	–5.5***	–6.3***	–5.6***	–6.3***	–5.5***	–6.3***
Control = Non-merging Chicago PMSA hospitals						
All patients	–6.6***	–7.2***	–6.9***	–7.1***	–7.1***	–7.0***
Private pay patients	–3.7**	–4.7***	–3.9**	–4.7***	–3.9**	–5.0***
Control = Chicago PMSA community hospitals						
All patients	–4.0*	–3.9*	–4.8**	–4.0**	–5.4*	–4.8**
Private pay patients	–2.0	–2.2	–2.6	–2.3	–2.6	–2.7

Source: IDPH and cost report data. Significance level: ***1%; **5%; *10%.

relative post-merger price change estimates following the Vista Health merger. These tend to be negative and statistically significant.

6. Conclusion

While confirming not all hospital mergers increase market power, our results suggest the Evanston merger enhanced the merged hospital's market power. Following the Evanston merger, the price increases were larger (and the differences were statistically significant) at the merged hospital relative to control hospitals. Further, the relative price increase at the merged hospital cannot be explained by changes in case mix, patients' severity of illness, payer mix, or teaching intensity. This strongly suggests the Evanston merger increased the hospital's market power – the hospital's ability to negotiate higher prices with commercial insurers.

Our results are consistent with the majority of non-econometric evidence. For example, even hospital executives in documents written shortly after the Evanston merger claimed that the price increases were due to the merger and the increased market power of the combined entity:

> Some $24 million of revenue enhancements have been achieved – mostly via managed care renegotiations [and] none of this could have been achieved by either Evanston or Highland Park alone. The "fighting unit" of our three hospitals and 1,600 physicians was instrumental in achieving these ends.[23]

Despite both the econometric and non-econometric evidence, Counsel for the merged hospital argued the hospital's relatively larger post-merger price increases were not the result of enhanced market power. Rather, Counsel for the hospital argued the post-merger price increases were the result of the hospital's "learning about demand". By this, Counsel meant that around the time of the merger, Evanston Hospital learned that it had previously been underestimating the willingness to pay for its services, and that learning this allowed the hospital to negotiate substantially higher prices.

As discussed in Balan and Garmon (2008), "learning about demand" is an attractive candidate for defendants to suggest as an alternative explanation. However, in this case, there was no evidence to suggest Evanston Hospital was pricing its services below competitive levels prior to the merger.[24] For example, Evanston Hospital was the most profitable hospital in the state of Illinois in 1999 – the year before the merger.[25]

Not surprisingly, both the Administrative Law Judge and the Commission ruled the Evanston merger gave the combined hospital the ability to raise prices through the exercise of market power.

Notes

1. Everything old is new again: health care and competition in the 21st century. Prepared remarks of Chairman Timothy Muris before the 7th Annual Competition in Health Care Forum, Chicago, IL, November 7, 2002, pp. 19–20. Available at: http://www.ftc.gov/speeches/muris/murishealthcarespeech0211.pdf
2. Provena St. Therese Medical Center and Victory Memorial Hospital.
3. Apart from material made public in the ENH trial, we will not describe qualitative evidence (e.g., documents, testimony, etc.) gathered in the investigations due to confidentiality.

4. Deborah Haas-Wilson served as Complaint Counsel's (i.e. FTC staff's) primary economic expert during the administrative trial.
5. Statement of the Federal Trade Commission, Victory Memorial Hospital/Provena St. Therese Medical Center, File #0110225. Available at: http://www.ftc.gov/os/caselist/0110225/040630ftcstatement0110225.htm
6. Commercial or private health insurers include all companies that offer health-care plans, whether the company offering the plan is bearing the risk of loss or whether the employer is bearing the risk of loss.
7. Town and Vistnes (2001).
8. Including those not listed in Table 1.
9. Between 1998 and 2002, the medical care component of the Chicago area price index increased by only 13.8%.
10. http://www.ftc.gov/os/adjpro/d9315/070806opinion.pdf, p. 83.
11. A merger is defined as a change in ownership for a hospital in the Chicago PMSA in which the acquiring party owns at least one other hospital in the Chicago PMSA. Merging hospitals were excluded back to 1996, even though our data begin in 1998, to eliminate potential residual effects of mergers on price.
12. In 1999, the relative weight for a bone marrow transplant was 10.21. This highlights another advantage of using DRG relative weights to case mix adjust prices: technological advances that make certain diagnoses relatively less resource intensive to treat are captured by using the DRG relative weights.
13. ENH and HPH data are pooled pre- and post-merger, since ENH and HPH observations in the MCO and cost report data cannot be distinguished post-merger. STMC and VMH data are pooled pre- and post-merger to conceal the identity of the MCOs.
14. In Stata terminology, we specify cluster(hospital).
15. Actually, what is reported is $e^{\beta 2}-1$ in percentage form.
16. To protect the identity of the commercial insurers, their names are masked when reporting the results. Also, we do not report sample sizes to avoid indirectly identifying insurers.
17. Our measure of price does not include outpatient services. It is very difficult to adjust outpatient visits for changes in case mix. Attempts to include outpatient price changes into the estimation of ENH/HPH's relative price change during the ENH/HPH trial resulted in price increase estimates that were very similar to the inpatient-only price increase estimates. See Opinion of the Commission in the Matter of Evanston Northwestern Healthcare Corporation, p. 38. Available at: http://www.ftc.gov/os/adjpro/d9315/070806opinion.pdf
18. In particular, we use 3M Health Information Systems' Core Grouping software to group cases into DRGs and APRDRGs.
19. The Net and Gross revenue amounts from the Cost Reports include both inpatient and outpatient hospital services, and all patients (not just commercially insured patients).
20. After the merger, ENH eliminated HPH's independent tax identification, so patients at HPH cannot be distinguished from patients at the legacy ENH hospitals, preventing the estimation of case-mix adjusted price increases separately at ENH and HPH.
21. While the payer names are masked, the payers listed in Tables 2 and 3 are the same as the first five payers in Table 1.
22. The complete coefficient estimates from the model on which these price changes are based are listed in Appendix B.
23. Commission's public decision, p. 17. Available at: http://www.ftc.gov/os/adjpro/d9315/070806opinion.pdf
24. The ALJ's public decision (http://www.ftc.gov/os/adjpro/d9315/051021idtextversion.pdf) and the Commission's public decision (http://www.ftc.gov/os/adjpro/d9315/070806opinion.pdf) list qualitative evidence that ENH was not behaving sub-optimally pre-merger.
25. Illinois Health Facilities Planning Board, "Hospital Capital Expenditure and Financial Information Report for 1999", March 2001. Available at: http://www.idph.state.il.us/pdf/capex-pendrept.pdf

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