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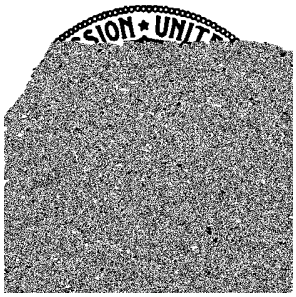

The Effect of Hospital Mergers on Inpatient Prices:
A Case Study of the New Hanover-Cape Fear Transaction

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The Effect of Hospital Mergers on Inpatient Prices: A Case Study of the New Hanover-Cape Fear Transaction

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Abstract

The Federal Trade Commission initiated a Hospital Merger Retrospective Project in 2002 to analyze the effects of consummated mergers. One of the mergers studied was the 1998 acquisition by New Hanover Regional Medical Center ("New Hanover") of Columbia Cape Fear Memorial Hospital ("Cape Fear") in Wilmington, North Carolina. In this paper, we employ patient-level claims data from four different insurers to estimate the effects of this merger on inpatient prices. Our results provide mixed evidence. Two of the insurers experienced substantial post-merger price increases relative to the control group of hospitals. The post-merger price changes for another insurer, however, were comparable to those for the control group, while the fourth insurer actually experienced a significant price decrease following the merger. Thus, it is difficult to draw conclusions about the impact of this merger on inpatient pricing.

[1] The views expressed in the paper are those of the author and not necessarily those of the Commission or any individual Commissioner. I am thankful to Michelle Kambara, Peter Newberry, and Jorge Roberts for outstanding research assistance and to Steve Tenn, Mike Vita, and an anonymous referee for helpful comments. All errors are my own.

Introduction

The hospital industry went through substantial consolidation during the 1990s. During this time, the Federal Trade Commission, Department of Justice, and the California Attorney General challenged seven hospital mergers and lost all seven cases.[2] As a result, the Federal Trade Commission initiated a Hospital Merger Retrospective Project in 2002 to analyze the effects of consummated mergers. One of the mergers studied was the 1998 acquisition by New Hanover Regional Medical Center ("New Hanover") of Columbia Cape Fear Memorial Hospital ("Cape Fear") in Wilmington, North Carolina. In this paper, we evaluate the effects of this merger on inpatient prices.

New Hanover is a large public non-profit hospital that offers a wide range of services, including tertiary care such as cardiac surgery. At the time of the acquisition, it had 546 staffed beds. Cape Fear was a small community hospital with 109 staffed beds that offered general acute care services. The two hospitals are located six miles apart from one another while the next closest hospital is over 20 miles away. Thus, those consumers located near New Hanover and Cape Fear may have viewed the two hospitals as very close substitutes for providing general acute care services. Thus, it is plausible that the acquisition enabled one or both of the merged parties to increase prices.

On the other hand, it is possible that competition from nearby hospitals constrained potential price increases. Table 1 lists the six hospitals that are located within 60 miles of New Hanover. The two closest hospitals, located within approximately 30 miles of New Hanover, are

[2] The seven cases were: California v. Sutter Health System (2000), FTC v Tenet Healthcare Corp. (1998), United States v. Long Island Jewish Medical Center, (1997), FTC v. Butterworth Health Corp. (1996), United States v. Mercy Health Services (1995), FTC v. Freeman Hospital,

very small – approximately one-half of the size of Cape Fear or smaller at the time of the acquisition.[3] The closest hospitals to New Hanover that are of comparable size to Cape Fear are 45 miles away. While this appears to be a long distance to travel for hospital services, the courts have accepted such large geographic markets. In FTC v. Freeman, for example, the court considered the merging parties to compete with hospitals located 50 miles away.[4]

Another issue is whether New Hanover's status as a public non-profit hospital would reduce its incentive to exercise market power. It has been argued that the objective of non-profit hospitals is to serve the community rather than to maximize profits.[5] Indeed, this argument has been accepted by the courts as a rationale for finding that mergers among non-profit hospitals are not likely to be anticompetitive.[6] Recent hospital merger retrospective studies, however, have provided evidence of significant post-merger price increases from mergers involving non-profit hospitals.[7]

Another consideration is whether the merger led to efficiencies that may have offset any potential anticompetitive effects. Following the merger, for example, New Hanover opened an

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(1995), In re Adventist Health System (2004).

[3] Pender Memorial, located 32 miles from New Hanover, is somewhat larger, but it has been operated by New Hanover since 1999. This is not an independent competitor.

[4] FTC v. Freeman Hospital, 911 F Supp. 1213 (W.D. MO. 1995), aff'd 69 F.3d 260 (8th Cir. 1995). See also Capps, Dranove, Greenstein, and Satterthwaite (2002) for a discussion of geographic market definition in recent hospital cases.

[5] See, for example, Lynk (1995).

[6] See, for example, United States v. Long Island Jewish Med. Ctr., 983 F. Supp. 121, 149, 146 (E.D.N.Y 1997) and FTC v. Butterworth Health Corp., 1997-2 Trade Cas. (CCH) (6th Cir. 1997). This argument was recently rejected, however, in the decision of Evanston Northwestern Healthcare Corp., FTC Docket No. 9315, Initial Decision (October 20, 2005).

[7] See Vita and Sacher (2001), Haas-Wilson and Garmon (2009), and Tenn (2008).

orthopedic specialty center at Cape Fear and consolidated orthopedic surgery at this location.[8] As another example, obstetric services were consolidated to the New Hanover location.[9] To the extent that these consolidations led to cost savings that were passed on to consumers, prices may have fallen, other things equal. Consolidations such as these may have also increased the quality of care in these areas. An analysis of possible merger-related quality improvements, however, is beyond the scope of this paper.

We estimate the effect of the New Hanover-Cape Fear merger on inpatient prices. Our analysis is based on patient-level claims data from New Hanover and four large managed care insurers. These data contain detailed information about the diagnosis, procedures, and payments relating to the claim as well as demographic information about the patient. We perform econometric analysis to control for factors, such as the types of illnesses treated, that are unrelated to the merger that may affect hospital prices. In addition, there may be unobservable factors that are also experienced by other hospitals, such as changes in technology. To control for such factors, we estimate the price changes at New Hanover relative to those at a control group of similar hospitals. In other words, we estimate the difference between the price changes for New Hanover and the price changes for the control group hospitals. This "difference-in-differences" approach is used in other merger retrospective studies.[10]

[8] www.nhrmc.org, accessed on 11/20/2008.

[9] www.nhrmc.org, accessed on 11/20/2008.

[10] See, for example, Vita and Sacher (2001), Taylor and Hosken (2007), Tenn (2008), and Haas-Wilson and Garmon (2009).

Econometric Model

A typical difference-in-differences approach to analyzing a hospital merger would involve estimating an equation similar to the following:

$$\ln p_i = X_i + \eta_i + \text{Post-Merger}_i + (\text{Post-Merger}_i * M_i$$

Unbiased standard errors can be obtained by using a simple two-stage approach.

coding errors, or missing data.[14] We restrict the dataset to claims for which the average payment per day is greater than $250.

The claims for New Hanover and Cape Fear are not identified separately post-merger in the insurer datasets. Thus, we estimate the combined price changes for New Hanover and Cape Fear ("New Hanover/Cape Fear") in our difference-in-differences analysis. Using the data provided by New Hanover, however, we are able to estimate the price changes for the two hospitals separately. Based on these data, the estimated price changes for New Hanover alone are similar to those for New Hanover and Cape Fear combined. This reflects, in part, the small size of Cape Fear relative to New Hanover.

The merger was consummated in November 1, 1999. But prices were largely determined by the existing pre-merger contracts until new contracts were negotiated. New Hanover negotiated its post-merger contracts with individual insurers at different times, with the effective dates of these contracts ranging from February 1999 to January 2001. In our benchmark specification, the pre-merger period is defined to be 1997-1998, and the post-merger period is defined to be 2001-2002.[15] The two years, 1999 and 2000, are considered to be the transition years and are omitted from the estimation.

[14] The data that we received from the insurers include multiple lines for each claim, representing the various procedures or services performed. The data are aggregated for each claim based on the claim number and/or other identifying information.

[15] Some of the datasets do not include data prior to 1997. In order for the pre-merger period to include two full years of data, the full year of 1998 is considered to be part of the pre-merger period even though the merger was consummated in November of that year. To the extent that New Hanover adjusted its pricing immediately, our results will underestimate the full impact of the merger. Sensitivity analysis, however, indicates that our results are robust to a number of different event windows.

Our benchmark control group includes urban hospitals in North Carolina that are similar in size to New Hanover.[16] In particular, this group is defined to include all urban hospitals in the state that have over 400 beds. One of the hospitals meeting these criteria was omitted from the benchmark control group because it also was involved in a merger of two hospitals located in close proximity to one another during the sample period.[17] The resulting control group consists of eleven hospitals.[18]

reported in the data so we use dummy variables based on the patient's primary ICD9 diagnosis code.[20]

had contracts with two of these insurers during the pre-merger period. The Cape Fear price change was similar to the New Hanover price change for one of these insurers and insignificant for the other. In order to protect the identity of the insurers, we do not report these results in the table.

The econometric results of equation (1) are reported in the next section of the table. The results in this table are based only on the data submitted by New Hanover and therefore do not reflect differences from the control group hospitals. The coefficient of the Post-Merger dummy variable indicates the change in admission prices after controlling for the patient characteristics, diagnosis, and type of insurance mix. This coefficient is statistically significant at the 1% level for all of the insurers. When changes are relatively small, this coefficient is a good approximation of the estimated percent price change. For larger changes, the implied price change can be derived as $\exp\left(G - \frac{se_G^2}{2}\right) - 1$, where G is the coefficient of the Post-Merger dummy variable, and se_G is its standard error.[21] The estimates indicate that prices increased by over 26% for Insurers 1, 2, and 3, and decreased by 23% for Insurer 4. In order to protect the identity of the individual insurers, we do not report the weighted average price change for the four insurers.

The estimated coefficients for the length of stay variable are statistically significant at the 1% level for all four insurer equations. They indicate that a 10% increase in the length of stay leads to an increase in price per admission ranging from 5.7% to 7.5%.

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unadjusted numbers do not match exactly those from New Hanover's admissions data, the implications are similar: Insurers 1, 2, and 3 experienced large pric

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Insurer 1 is statistically significant at the 10% level, and the coefficients for Insurers 2 and 4 are

respect to the post-merger price changes are very similar to those reported above. Our results are also robust to whether the estimation equation includes the variables for the patient's length of stay, age and sex.

We also tested the sensitivity of our results to the definition of the pre- and post-merger periods. For one specification, we defined the pre-merger period to be the one year prior to the consummation of the merger (i.e., 11/1997 – 10/1998) and the post-merger period to be one year following the effective date of the first post-merger contract between New Hanover/Cape Fear and the particular insurer. The results are broadly similar to those reported in Table 4 and do not affect our conclusions that Insurers 1 and 2 experienced large price increases following the merger while Insurer 4 experienced a large price decrease.

Our results are also robust to whether individual control group hospitals are included or omitted from the control group. In other words, our results are not driven by one or two of the control group hospitals. Another possible control group would consist of the six hospitals located in the counties surrounding New Hanover County. These hospitals are all relatively small and, thus, were not included in our initial control group. They presumably, however, face similar local costs such as wages. We repeated the analysis for Insurer 1 using this alternative group of control hospitals. Prices for the control group fell by 10% between the pre- and post-merger periods, and the estimated price change for New Hanover/Cape Fear relative to this group was similar to our benchmark results for this insurer. In addition to providing a robustness check for our benchmark results, the substantial increase in New Hanover/Cape Fear's price relative to nearby hospitals indicates that these hospitals were not able to constrain a price increase, at least for this insurer. While we did not repeat this sensitivity analysis for the other

insurers, the decrease in prices for this control group suggests that it is unlikely that local cost increases could explain the large price increases experienced by Insurer 2.

Conclusion

Our results provide mixed evidence regarding the effect of the New Hanover-Cape Fear transaction on inpatient prices. Two of the insurers experienced substantial post-merger price increases relative to the control group of hospitals. The post-merger price changes for another insurer, however, were comparable to those for the control group, while the fourth insurer actually experienced a significant price decrease following the merger.

An interesting question that arises from these results is whether differences among insurers may lead to different post-merger outcomes. Haas-Wilson and Garmon (2009) also find that estimated post-merger price changes varied across insurers in their study of two hospital mergers in Chicago. Possible explanations for such variations include the insurers' bargaining abilities, the types of plans that they offer, and the services that they provide.[23] It may be, however, that some of the estimated price changes reflect factors that are unrelated to the merger. Thus, it is difficult to draw conclusions about the impact of the New Hanover-Cape Fear merger on inpatient pricing.

[23] We cannot address this issue here because we are required to protect the identity of the insurers.

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Table 1: Hospitals Located within 60 Miles of New Hanover

Hospital Name	Location	# of Staffed Beds in 1998	Distance from New Hanover
Merging Parties			
New Hanover	Wilmington, NC	546	
Columbia Cape Fear	Wilmington, NC	109	6 miles
Closest Hospitals			
Brunswick Community	Supply, NC		miles

Table 2: Variable Definitions

Variable	Definition
Dependent Variable: Price per Admission	The total payments made by the insurer and patient for each inpatient admission.
Post- Merger Dummy Variable	A dummy variable is equal to zero for admissions during the pre-merger period, 1997-1998, and equal to one during the post-merger period, 2001-2002.
Diagnosis	We control for each diagnosis by including a dummy variables based on the patient's DRG code for each of the following categories: angioplasty, c-section (high), c-section (normal), cardiac stent, cardiac surgery, other cardiology, joint replacement, neurosurgery, nicu, normal newborn, vascular, obstetrics (other than c-section), high-risk obstetrics (other than c-section), medical (not otherwise specified), and surgical (not otherwise specified). For one insurer, DRG codes are not reported in the data so we use dummy variables based on the patient's primary ICD9 diagnosis code.
Sex	A dummy variable equal to one if the patient is female.
Age	The patient's age, measured in years
Length of Stay	The number of days that the patient was in the hospital for the particular admission.
Plan Type	A dummy variable equal to one if the patient's insurance plan is an HMO.

Table 3: Post-Merger Price Changes for New Hanover-Cape Fear Based on the New Hanover's Admissions Records

	Insurer 1	Insurer 2	Insurer 3	Insurer 4
Unadjusted Price Change				
	106%	62%	24%	-18%
Econometric Results				
Post-Merger	0.509**	0.722**	0.235**	-0.260**
	(0.014)	(0.024)	(0.024)	(0.012)
Length of Stay	0.571**	0.746**	0.638**	0.677**
	(0.013)	(0.020)	(0.021)	(0.012)
Age	0.006**	0.008**	0.008**	0.003**
	(0.001)	(0.001)	(0.001)	(0.001)
Sex (female=1)	0.079**	0.038	0.089**	0.048**
	(0.016)	(0.024)	(0.028)	(0.014)
R-squared	0.749	0.751	0.778	0.767
Implied Post-Merger Price Change				
	66%	106%	26%	-23%

Notes: The post-merger period is defined to be 2001-2002 and the pre-merger period is defined to be 1997-1998. The estimation equations also include dummy variables for diagnosis categories and dummy variables for the type of insurance plan. Standard errors are in parentheses.
** The estimate is statistically significant at the 1% level.

Table 4: Price Changes for New Hanover-Cape Fear relative to the Control Group Based on the Health Insurers' Admission Records

	Insurer 1	Insurer 2	Insurer 3	Insurer 4
Unadjusted Price Change				
New Hanover/Cape Fear	135%	46.7%	30.3%	-16%
Control Group	4%	-2.8%	27.6%	13%
Difference	131%	49.5%	2.7%	-29%
Econometric Results				
Intercept	0.065	-0.124**	0.243**	0.090**
	(0.077)	(0.047)	(0.025)	(0.033)
New Hanover-Cape Fear	0.483*	0.516**	0.073	-0.350**
	(0.266)	(0.164)	(0.079)	(0.115)
Adjusted R-squared	0.174	0.449	-0.018	0.4301
Implied Price Change				