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States' Merger Review Authority Is Associated With States Challenging Hospital Mergers, But Prices Continue To Increase

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ABSTRACT States can challenge proposed hospital mergers by using antitrust laws to prevent anticompetitive harms. This observational study examined additional state laws—principally charitable trust, nonprofit corporation, health and safety, and certificate-of-need laws—that can serve as complements and substitutes for antitrust laws by empowering states to be notified of, review, and challenge proposed hospital mergers through administrative processes. During the period 2010–19, 862 hospital mergers were proposed, but only forty-two (4.9 percent) were challenged by states, including thirty-five by states without federal involvement, of which twenty-five (71.4 percent) originated in the eight states with the most robust merger review authority. The twenty-five challenges resulted in two mergers being blocked; three being abandoned; and twenty being approved with conditions, including seven with competitive-impact conditions. Hospital market concentration and prices increased at similar rates in these eight states versus other states, potentially because most challenges allowed mergers to proceed with conditions that did not adequately address competitive concerns. Although these findings do not reveal an optimal state framework, elements of advanced state merger review authority may have the potential to improve poorly functioning hospital markets.

Health care provider markets in the United States have consolidated into large hospital and health systems.¹ During 1998–2017, 1,577 hospital mergers occurred,² which contributed to 95 percent of hospital markets—defined as Metropolitan Statistical Areas (MSAs)—being highly concentrated in 2018.³ Although horizontal hospital mergers and acquisitions could theoretically generate cost savings that are passed on to purchasers and improve quality, studies have found mixed or the opposite results: Consolidation is inconsistently associated with cost reductions⁴ but is strongly associated with higher prices and simi-

lar or reduced quality.^{5–9} Evidence is emerging that cross-market hospital mergers can also lead to higher prices.¹⁰ Higher hospital market concentration has also been associated with higher Affordable Care Act Marketplace premiums^{11,12} and reductions in wage growth.¹³

Although concentration in health care markets has increased dramatically since the early 1990s,^{2,3,5,14} much of it has occurred with little to no antitrust scrutiny.^{2,15,16} At the federal level, the Department of Justice (DOJ) and Federal Trade Commission (FTC) monitor market conduct, review proposed mergers, and engage in enforcement activities to foster competition.¹⁷ However, limited time and resources prevent federal anti-

trust enforcers from effectively monitoring and challenging all anticompetitive mergers in health care markets. Moreover, in 2021 the Hart-Scott-Rodino Antitrust Improvements Act of 1976 notification threshold for a merger's deal value was \$92 million, yet the median hospital merger deal value during 2016–20 was, on average, \$51 million, meaning that most mergers fell below the federal notification threshold.¹⁸

State antitrust enforcement efforts bolster and augment federal antitrust enforcement. Although state attorneys general can challenge hospital mergers by filing a lawsuit under federal or state antitrust laws or by joining a challenge with the FTC, states can draw from a broader range of authority to review potentially anticompetitive mergers.^{3,19,20} This authority resides in the office of the state attorney general, a department of health, an agency specifically designed to control health care costs, or a certificate-of-need program. Legislatures have granted merger review authority through laws governing charitable trusts, nonprofit corporations, health and safety, and certificate-of-need programs.

Although merging entities can use the courts to challenge administrative decisions arising from these processes, the courts give deference to state agency decisions unless they violate statutory or constitutional provisions; the agency acted beyond its authority, engaged in an unlawful procedure, or made a clearly erroneous decision; or the decision was arbitrary and capricious. This standard makes these merger review frameworks potentially more successful in preventing anticompetitive mergers compared with states pursuing antitrust lawsuits, in which the burden of proof rests with the state to demonstrate that the proposed merger is anticompetitive.

Many state merger review authority laws do not explicitly focus on evaluating proposed hospital mergers from an antitrust perspective, instead focusing on objectives such as protecting charitable assets. However, some states' merger review authorities do encompass competition-related concerns. Such authorities range from only requiring notice of certain types of proposed mergers to empowering a state agency to review and approve proposed mergers based on how they affect competition. State laws only requiring merging entities to notify a state agency of a proposed merger could also be used to provide notice of potential mergers to the attorney general, who could bring an antitrust lawsuit. States with more robust merger review authority receive notice of a much wider range of proposed mergers and are empowered to approve, conditionally approve, or block mergers without having to go to court. In sum, these laws

serve as both complements and substitutes to state and federal antitrust laws, by providing information that can inform a state's decision to investigate and file suit under antitrust laws or by supplying an administrative process through which states can challenge mergers.

The objective of this observational study was to analyze how various forms of state merger review authority are related to three outcomes: the percentage of proposed hospital mergers that were challenged during 2010–19, the change in hospital market concentration from 2010 to 2019, and the change in inpatient hospital prices from 2010 to 2016 (the latest year of hospital price data). We classified each state's merger review authority to analyze those relationships. We hypothesized that states with stronger merger review authority would challenge a higher share of mergers, potentially moderating growth in hospital market concentration and prices.

Study Data And Methods

OUTCOME VARIABLES The outcome variables included the share of proposed hospital mergers that were challenged, hospital market concentration, and hospital prices. Proposed hospital mergers and acquisitions (hereafter “mergers”) were identified using Irving Levin Associates' annual *Healthcare Services Acquisition Report*.²¹ A proposed merger was defined as being challenged if a state, through its attorney general, certificate-of-need program, or other state health agency, attempted to block the merger or impose conditions on its approval through an administrative process or filing an antitrust lawsuit, or if the merging entities likely abandoned the deal as a result of the state's review of the proposed merger. If a state or federal inquiry or investigation resulted in a merger being approved without conditions, it was not counted as a challenge. The challenges were determined on the basis of the authors' research of legal databases, news sources, and federal and state government websites.

We used the Herfindahl-Hirschman Index (HHI) to measure market concentration. This measure and the geographic and product market definitions are explained in a prior study¹⁴ and are summarized in the online appendix.²² The HHI was calculated for each MSA during the period 2010–19, using data from American Hospital Association Annual Survey Databases.²³

Hospital prices were based on a standardized hospital admission to account for admission-intensity differences among states, which affect price. Prices were based on the amounts paid as reported in the Health Care Cost Institute claims data from the period 2010–16,²⁴ and the mean

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price of a standardized hospital admission was calculated each year at the MSA level. The Health Care Cost Institute data pool medical claims from three large US health insurers—Aetna, Humana, and UnitedHealthcare—and cover, on average, forty-two million people younger than age sixty-five with commercial insurance per year from every state and MSA. For additional detail on the price measure, see the appendix²² and the work of Christopher Whaley and colleagues.²⁵

STATES' MERGER REVIEW AUTHORITY States can challenge proposed health care mergers in court by using state and federal antitrust laws. In this study we identified and reviewed additional state statutes that could be used to address market consolidation, including statutes that require notification of proposed mergers; stipulate merger review criteria; and grant a state agency the authority to approve, conditionally approve, or block proposed mergers. Statutes from all fifty states and Washington, D.C., were identified using the Database of State Laws Impacting Healthcare Costs and Quality maintained by The Source on Healthcare Price and Competition,²⁶ state legislative websites, and Westlaw.

We classified states into seven categories based on the degree to which their merger review authority laws could be used to address health care consolidation. The categories were determined by whether the laws specifically pertain to health care mergers; the scope of hospital mergers that require notice (for example, nonprofit versus all hospitals); the review criteria used by the agency to analyze the merger (for example, competition-based criteria); and the agency's authority to approve, conditionally approve, or block the proposed merger either administratively or by filing a lawsuit in court. States were classified according to the highest category of their statutes. In all categories, laws requiring merging entities to notify a state agency can help the state identify potentially anticompetitive mergers and investigate whether to challenge a merger using their merger review authority or antitrust laws.

The seven categories of merger review laws were combined into the following three groups based on the breadth of health care mergers that the state received notice of and could review and how explicitly the laws required a competition-based review. (More details are in the appendix.)²²

► **CATEGORIES 1–3:** The first group includes states with no merger notification requirements or authority to review proposed mergers (category 1), states with merger notification requirements and authority to narrowly review proposed mergers under general nonprofit corporation laws to ensure the charitable purposes of the entities will continue after the merger

(category 2), and states with merger notification requirements for health care mergers and narrow review authority under health care-specific nonprofit laws or under certificate-of-need programs (category 3).

► **CATEGORIES 4 AND 5:** This group includes states with health care-specific merger notification requirements and the authority to consider cost, affordability, or access criteria to either review (category 4) or approve (category 5) proposed mergers through either nonprofit merger review or certificate-of-need programs. Although this authority potentially addresses competition-related concerns, the statutes do not require this.

► **CATEGORIES 6 AND 7:** This group includes states with health care-specific notification requirements and the authority to use competition-based criteria for the review of either nonprofit hospital mergers (category 6) or almost all hospital mergers (category 7). Most states in this group have the authority to approve, conditionally approve, or block mergers through administrative processes without having to go to court. For example, Connecticut's certificate-of-need program in category 7 must consider the impact of certain proposed mergers on competition as part of its approval process. Although certificate-of-need programs are considered to be anticompetitive because they create barriers to entry,²⁷ Connecticut's approach illustrates that such programs can be modified to potentially include effective merger review processes.

STATISTICAL ANALYSES We used regression analysis for three sets of models to estimate the association between states' merger review authority and hospital merger challenges, hospital market concentration, and hospital prices. In this section we describe each set of regression models in turn, but we begin by describing the key independent variable—each state's hospital merger review authority category—because it is the same in each model. The descriptive statistics for each variable in the models are in appendix exhibit A2.²² The key independent variable included a set of indicator variables—one for each of the seven merger review authority categories. In each set of regression models, model 1 included the seven categories of state laws, model 2 added covariates, and model 3 collapsed the state laws into three groups: no review, nonprofit review, or certificate-of-need review (categories 1–3, the reference group); cost, affordability, or access review (categories 4 and 5); and competition-based review (categories 6 and 7).

To examine the association between states' merger review authority and their likelihood of challenging a proposed merger, we estimated a logistic regression model at the merger level. The

dependent variable was 1 if the proposed merger was challenged and 0 otherwise. Because this analysis focused on state-only challenges, we excluded challenges in which the state attorney general joined a challenge brought by the FTC or instances in which the FTC brought a challenge without any state involvement, which resulted in 855 proposed mergers, of which 35 were challenged. Our model controlled for several variables whose selection was informed by a study that examined antitrust enforcement by state attorneys general and was also based on data availability²⁸ (see the appendix for details).²²

To examine the association between states' merger review authority and the change in the HHI for hospitals, we estimated a regression model at the MSA level, excluding rural areas because many contain only one hospital. The dependent variable was the change in the HHI for hospitals from 2010 to 2019. The models controlled for the baseline hospital HHI in 2010 and changes in the following measures between 2010 and 2019 because they may affect the change in hospital HHI: insurer HHI; population; median household income; uninsurance rate; unemployment rate; Medicare Wage Index; and percentages of commercial inpatient days, for-profit hospitals, system hospitals, and major teaching hospitals. The selection of these variables was informed by two studies^{29,30} and based on data availability.

To examine the association between states' merger review authority and the change in hospital prices, we estimated another regression model at the MSA level. The dependent variable was the change in the natural log of hospital inpatient prices from 2010 to 2016. The model controlled for the baseline hospital prices in 2010 and changes in the same measures (from 2010 to 2016) that the market concentration model included, as changes in those measures may also affect hospital inpatient prices.

LIMITATIONS This study had limitations. Although we tracked proposed hospital mergers from initial report to consummation, rejection, or abandonment, we may have missed some challenges, particularly conditional approvals that impose minor conditions that were not publicly reported. If more of these omitted challenges were from states with merger approval authority, as opposed to being from states without approval authority that must challenge mergers in court, which have more consistent public reporting requirements, then our regression-based estimate of the additional share of mergers challenged by these states would represent a lower bound. In addition, because of the lack of public information, we were not able to include challenges in

which the state aided the FTC but did not join the case, nor were we able to include informal inquiries by a state or the FTC that led to the merger being abandoned before a formal challenge.

Our models estimated a well-controlled association between the outcomes and the categories of merger review authority because they controlled for time-invariant outcome differences among the categories of states and also for time-varying confounding variables. Although some of our models combined the seven categories of merger review laws into three groups, the statistical power to detect a significant association was limited, particularly for a rare event such as a proposed merger being challenged.

Because only four states changed merger review authority categories during the study period, there was insufficient variation to precisely estimate within-state fixed effects models. In our models the parameter estimates may be biased if states that enacted more stringent statutes did so in reaction to an outcome variable in a prior period (also known as reverse causation) or if confounding variables were omitted. Because most states had already enacted their statutes before the beginning of the study period, this data limitation precluded us from assessing reverse causation. One potential confounding variable was the market concentration of hospitals in the target hospital's market because a proposed merger in a market with higher concentration will more likely be challenged. More than half of recent mergers were across markets, involving targets in different MSAs than the acquiring hospital or system.¹⁰ Therefore, when we included the hospital HHI of the target hospital's MSA in the model, it could not be clearly interpreted, so this variable was excluded. However, its exclusion did not substantively change the main results.

Although MSAs are generally larger than markets defined by structural models, such as option demand markets,³¹ they were used for analytic convenience; however, their size dilutes the impact of mergers on market concentration. Finally, the regression models did not control for factors beyond the statutory framework that affect a state's ability to address health care consolidation, such as state agency resources and the practical application of the statutes.

Study Results

MERGER CHALLENGES During the period 2010–19, 862 hospital mergers were proposed in the United States, but only forty-two (or 4.9 percent) were challenged, including seven challenges involving the FTC and thirty-five challenges only involving state agencies (appendix exhibit A1

and “Supplemental Information on Federal Challenges” in the appendix).²² Exhibit 1 shows only the 855 proposed mergers that did not involve a federal challenge, of which states challenged thirty-five (or 4.1 percent), resulting in two being blocked, five being abandoned, and twenty-eight being approved with conditions. The states in categories 1–3 challenged only six (1.3 percent) of the proposed mergers in their states. States with the authority to use cost, affordability, and access criteria to either review (category 4) or approve (category 5) proposed mergers challenged only three (2.3 percent) and one (1.0 percent) proposed mergers, respectively. In contrast, states with authority to review and approve proposed mergers using competition-based criteria (categories 6 and 7) challenged thirteen (11.1 percent) and twelve (54.5 percent), respectively, accounting for the vast majority

(71.4 percent) of all challenges that occurred during the study period. These states were also more likely to use their antitrust laws to challenge a proposed merger, but they did so on only four occasions (appendix exhibit A1).²² However, these states approved, with conditions, twenty of the twenty-five proposed mergers they challenged. Only seven approvals included competition-related conditions, representing 5.0 percent of the proposed mergers in these states. States in categories 1–5 approved mergers with competition-related conditions for only 3 of 716 (0.4 percent) proposed mergers (exhibit A1).²²

Mergers that occurred in states with more authority to review mergers were more likely than mergers in other states to be challenged (exhibit 2). For example, model 3 shows that mergers proposed in category 6 and 7 states were more

EXHIBIT 1

Number of proposed hospital mergers and challenges by state merger review authority category, 2010–19

State merger review authority categories	No. of states in category, 2019 ^a	No. of proposed mergers, 2010–19 ^b	No. of challenges, 2010–19 ^b	Percent of mergers challenged	Outcome of challenges
1: No statute	11: AL, AK, AR, FL, IA, KS, NM, NV, OK, TX, UT, IL (2010–18), SD (2010–15)	237	0	0.0	None
2: General nonprofit review	9: IN, MO, MN, MT, NC, NY, SC, SD (2016–19), WY	134	3	2.2	1 abandoned, 2 approved with conditions
3: Health care–specific nonprofit or CON review	9: DC, ID, KY, ME, ND, OH, WI, WV, IL (2019), CT (2010–13)	107	3	2.8	1 abandoned, 2 approved with conditions
4: Health care–specific nonprofit review includes cost, affordability, or access criteria	6: AZ, CO, GA, LA, TN, VA, MA (2010–12)	133	3 ^c	2.3	3 approved with conditions
5: Health care–specific nonprofit or CON approval includes cost, affordability, or access criteria	8: DE, MD, MI, MS, NE, NJ, VT, WA	105	1	1.0	1 approved with conditions
6: Health care–specific nonprofit or CON notice to attorney general and approval based on competition-based criteria	5: CA, NH, OR, PA, MA (2013–19)	117	13	11.1	2 blocked, 2 abandoned, 9 approved with conditions
7: Health care–specific notice for all proposed mergers and approval based on competition-based criteria	3: HI, RI, CT (2014–19)	22	12 ^d	54.5	1 abandoned, 11 approved with conditions
Total	51	855	35	4.1	2 blocked, 5 abandoned, 28 approved with conditions

SOURCE Authors’ analysis of state statutes and merger challenges and Irving Levin Associates’ annual *Healthcare Services Acquisition Report* (note 21 in text). **NOTES** Exhibit A1 is a more detailed version of this exhibit (see note 22 in text), listing the state and state agency that challenged the proposed mergers and including challenges that involved the federal government. CON is certificate-of-need. ^aThe number of states (including Washington, D.C.) reported by category is as of December 31, 2019, and the years reported next to Connecticut, Illinois, Massachusetts, and South Dakota are the years those states were classified in that specific category. ^bThe number of proposed mergers includes only mergers whose challenges did not have Federal Trade Commission involvement, which is consistent with the logistic regression model (exhibit 2). In addition, the number of proposed mergers and challenges by category accounts for the four states (Connecticut, Illinois, Massachusetts, and South Dakota) that changed categories during the study period by assigning proposed mergers and challenges to the category that the state was classified in the year of the proposed merger. ^cVirginia and Tennessee both imposed conditions via Certificates of Public Advantage for the same merger, so those imposed conditions were counted as one challenge. ^dRhode Island and Connecticut imposed conditions on the same merger, so those challenges were counted as one challenge.

EXHIBIT 2

Relative odds of hospital mergers being challenged in US states, by state merger review authority category and selected characteristics, 2010-19

Variables	Regression results					
	Model 1		Model 2		Model 3	
	aOR	SE	aOR	SE	aOR	SE
State merger review authority						
Categories 1-2	Ref		Ref		— ^a	— ^a
Category 3	3.54*	2.67	4.07**	2.73	— ^a	— ^a
Category 4	3.80	3.63	3.83**	2.60	— ^a	— ^a
Category 5	1.18	1.09	1.04	1.12	— ^a	— ^a
Category 6	14.0***	10.8	10.6***	6.57	— ^a	— ^a
Category 7	147***	90.5	104***	76.5	— ^a	— ^a
Categories 1-3	— ^a	— ^a	— ^a	— ^a	Ref	
Categories 4-5	— ^a	— ^a	— ^a	— ^a	1.56	1.01
Categories 6-7	— ^a	— ^a	— ^a	— ^a	11.6***	6.70
Democratic attorney general	— ^a	— ^a	1.85	1.22	2.26	1.42
County population (100,000s)	— ^a	— ^a	1.05	0.0442	1.02	0.0510
County median household income (\$10,000s)	— ^a	— ^a	1.42***	0.142	1.40***	0.131
County unemployment rate (%)	— ^a	— ^a	1.00	0.0000167	1.00	0.0000187
2010	— ^a	— ^a	Ref		Ref	
2011	— ^a	— ^a	2.29	2.17	2.30	2.14
2012	— ^a	— ^a	1.06	0.981	1.23	1.19
2013	— ^a	— ^a	2.00	2.47	1.70	2.26
2014	— ^a	— ^a	0.922	1.14	0.741	0.871
2015	— ^a	— ^a	1.04	1.22	1.25	1.53
2016-17	— ^a	— ^a	0.180**	0.150	0.247*	0.201
2018	— ^a	— ^a	0.815	1.19	1.34	1.73
2019	— ^a	— ^a	0.274	0.329	0.258	0.296
Constant	0.00813***	0.00443	0.00832***	0.000677	0.00137***	0.00111

SOURCE Authors' analysis of state statutes and merger challenges, Irving Levin Associates' annual *Healthcare Services Acquisition Report* (note 21 in text), American Hospital Association Annual Survey Database, and Area Health Resources File. **NOTES** The three models use the same dependent variable indicating whether a proposed merger was challenged, but they include different sets of independent variables as described in the text. The N for each regression model was 855 (instead of 862) because seven proposed mergers whose challenges involved the Federal Trade Commission were removed. The pseudo R² values for models 1, 2, and 3 were 0.257, 0.342, and 0.278, respectively. The year indicator variables for 2016 and 2017 were combined because the model could not estimate a parameter for the year 2016 by itself, as no proposed mergers were challenged that year. State merger review authority categories 1 and 2 were combined for the same reason; specifically, no proposed mergers were challenged in category 1. Results are presented as adjusted odds ratios. The constant term estimates baseline odds. Standard errors (SEs) were estimated by clustering at the state level. aOR is adjusted odds ratio. ^aIndependent variable was not included in the model. *p < 0.10 **p < 0.05 ***p < 0.01

likely to be challenged (adjusted odds ratio: 11.59; p < 0.01) compared with mergers proposed in category 1-3 states (the reference group).

MARKET CONCENTRATION Next, we turn to the hospital market concentration results. The unadjusted mean hospital HHI increased by a similar percentage from 2010 to 2019 in states with different merger review authority, ranging from 7.3 percent in MSAs in states in categories 1-3 and categories 6 and 7 to 9.4 percent in MSAs in states in categories 4 and 5 (appendix exhibit A3).²² Exhibit 3 shows the regression results for the changes in HHI at the MSA level from 2010 to 2019. In these models the state merger review categories were not consistently associated with a change in the hospital HHI. Model 3 shows that neither competition-based review (categories 6 and 7) nor review based on cost, affordability, or access (categories 4 and 5) was

associated with a change in the hospital HHI.

PRICES When we examined the hospital price results, the null findings persisted. The unadjusted mean hospital price for a standardized admission increased by a similar percentage from 2010 to 2016 in states with different merger review authorities, ranging from 24.4 percent in MSAs in states with category 4 and 5 levels of authority to 28.7 percent in MSAs in states with category 1-3 levels (see appendix exhibit A4).²² Exhibit 4 shows the regression results from an MSA-level model in which the dependent variable is the change in the natural log of the mean standardized inpatient hospital price level from 2010 to 2016. In these models, the state merger review categories were not consistently associated with a change in hospital prices. States in category 7 approached being associated with higher hospital prices in 2016 compared with 2010 (model 2, coefficient = 0.245; p < 0.10),

EXHIBIT 3

Change in hospital Herfindahl-Hirschman Index (HHI) in US states, by state merger review authority category and selected characteristics, 2010–19

Variables	Regression results					
	Model 1		Model 2		Model 3	
	Parameter estimate	SE	Parameter estimate	SE	Parameter estimate	SE
State merger review authority						
Category 1	Ref		Ref		— ^a	— ^a
Category 2	208	157	170*	140	— ^a	— ^a
Category 3	97.7	201	14.2	176	— ^a	— ^a
Category 4	377*	210	340	227	— ^a	— ^a
Category 5	135	168	97.7	161	— ^a	— ^a
Category 6	37.7	167	69.1	143	— ^a	— ^a
Category 7	122	220	−96.0	177	— ^a	— ^a
Categories 1–3	— ^a	— ^a	— ^a	— ^a	Ref	
Categories 4–5	— ^a	— ^a	— ^a	— ^a	185	151
Categories 6–7	— ^a	— ^a	— ^a	— ^a	11.1	121
Hospital HHI, 2010	−0.0746***	0.0144	−0.104***	0.0157	−0.103***	0.0157
Change in insurer HHI	— ^a	— ^a	−0.0824	0.0623	−0.0583	0.0627
Change in MSA population (100,000s)	— ^a	— ^a	−104***	36.2	−101***	33.2
Change in median household income (\$10,000s)	— ^a	— ^a	−1,245*	735	−1,321*	722
Change in uninsurance rate (pp)	— ^a	— ^a	−4.92	16.9	−3.42	16.3
Change in unemployment rate (pp)	— ^a	— ^a	34.7	21.2	31.6	21.4
Change in Medicare wage index	— ^a	— ^a	302	547	271	582
Change in percent of commercial inpatient days (pp)	— ^a	— ^a	−0.309	5.03	−0.393	5.02
Change in percent of for-profit hospitals (pp)	— ^a	— ^a	−7.80	5.97	−7.74	5.90
Change in percent of system hospitals (pp)	— ^a	— ^a	5.00**	2.00	5.27**	1.98
Change in percent of major teaching hospitals (pp)	— ^a	— ^a	−2.38	3.84	−2.56	3.70
Constant	716***	134	1,220***	161	1,258***	154

SOURCE Authors' analysis of state statutes and merger challenges, American Hospital Association Annual Survey Database, and Area Health Resources File. **NOTES** The three models use the same dependent variable—the change in hospital HHI—but they include different sets of independent variables as described in the text. Each model includes 381 of the 382 MSAs; one MSA had missing hospital HHI data. The R^2 values for models 1, 2, and 3 were 0.0581, 0.128, 0.120, respectively. The states that switched categories during the study period were included in the category in which they were for the majority of the study period, including Connecticut in category 7, Illinois in category 1, Massachusetts in category 6, and South Dakota in category 1. Standard errors (SEs) were estimated by clustering at the state level. Changes in variables are from 2010 to 2019. MSA is Metropolitan Statistical Area. pp is percentage points. ^aIndependent variable was not included in the model. * $p < 0.10$ ** $p < 0.05$ *** $p < 0.01$

but the association did not reach the conventional 0.05 significance level.

Discussion

Hospital markets are not functioning well in the United States, and hospital mergers have led to less competitive markets.² In response, some states have begun enhancing antitrust enforcement and oversight, two critical elements within Martin Gaynor's framework to address the lack of competition in health care markets.³² The laws we reviewed serve as both complements and substitutes to the authority granted to state attorneys general and federal antitrust agencies to challenge mergers under antitrust law.

As complements, the notification and review requirements in the state merger review laws can alert state attorneys general of potentially anti-competitive mergers, which is important for pro-

posed mergers that do not meet the federal notification threshold under the Hart-Scott-Rodino Antitrust Improvements Act.³³ This notification can inform the state's decision to challenge a proposed merger or initiate an investigation, which in some cases can cause the entities to abandon the merger altogether. Furthermore, some of these laws require state agencies to devote resources to examining proposed mergers, which may provide useful evidence to enforcement agencies if they bring a case under state or federal antitrust laws.

As substitutes, some laws create administrative processes through which state agencies or attorneys general can review, and in some states challenge, mergers. Many of these merger approval processes offer an alternative mechanism to litigation for ensuring prompt and accurate reviews of mergers and, where appropriate, for blocking mergers. If merging entities challenge

EXHIBIT 4

Change in natural log of hospital prices in US states, by state merger review authority category and selected characteristics, 2010-16

Variables	Regression results					
	Model 1		Model 2		Model 3	
	Parameter estimate	SE	Parameter estimate	SE	Parameter estimate	SE
State merger review authority						
Category 1	Ref		Ref		— ^a	— ^a
Category 2	0.0343	0.0240	0.0489*	0.0281	— ^a	— ^a
Category 3	0.0984***	0.0344	0.120***	0.0359	— ^a	— ^a
Category 4	0.000949	0.0324	0.0327	0.0336	— ^a	— ^a
Category 5	0.00678	0.0525	0.0257	0.0467	— ^a	— ^a
Category 6	0.0144	0.0252	0.0113	0.0370	— ^a	— ^a
Category 7	0.269*	0.146	0.245*	0.145	— ^a	— ^a
Categories 1-3	— ^a	— ^a	— ^a	— ^a	Ref	
Categories 4-5	— ^a	— ^a	— ^a	— ^a	-0.0147	0.0282
Categories 6-7	— ^a	— ^a	— ^a	— ^a	-0.0224	0.0301
Hospital prices, 2010 (\$ natural log)	-0.117***	0.0243	-0.136***	0.0254	-0.134***	0.0250
Change in insurer HHI	— ^a	— ^a	-4.69E-06	1.68E-05	-2.88E-06	1.80E-05
Change in MSA population (100,000s)	— ^a	— ^a	0.0195***	0.00599	0.0147**	0.00621
Change in median household income (\$10,000s)	— ^a	— ^a	0.567	0.341	0.719**	0.342
Change in uninsurance rate (pp)	— ^a	— ^a	-0.00211	0.00471	0.00102	0.00503
Change in unemployment rate (pp)	— ^a	— ^a	0.000219	0.00665	-0.00234	0.00683
Change in Medicare wage index	— ^a	— ^a	0.175**	0.0817	0.202**	0.0899
Change in percent of commercial inpatient days (pp)	— ^a	— ^a	0.00331**	0.00140	0.00305**	0.00146
Change in percent of for-profit hospitals (pp)	— ^a	— ^a	0.000189	0.000606	0.0000989	0.000533
Change in percent of system hospitals (pp)	— ^a	— ^a	-0.000159	0.000344	-8.21E-06	0.000344
Change in percent of major teaching hospitals (pp)	— ^a	— ^a	-0.00372*	0.00191	-0.00292	0.00194
Constant	1.35***	0.228	1.48***	0.231	1.51***	0.232

SOURCE Authors' analysis of state statutes and merger challenges, Health Care Cost Institute claims data, American Hospital Association Annual Survey Database, and Area Health Resources File. **NOTES** The three models use the same dependent variable (the change in natural log of hospital price), but they include different sets of independent variables. Each model includes 380 of the 382 Metropolitan Statistical Areas (MSAs); 2 MSAs had missing hospital price data. The R² values for models 1, 2, and 3 were 0.102, 0.161, and 0.112, respectively. The states that switched categories during the 2010-16 period were included in the category in which they were for the majority of this period, including Connecticut in category 3, Illinois in category 1, Massachusetts in category 6, and South Dakota in category 1. Standard errors (SEs) were estimated by clustering at the state level. Changes in variables are from 2010 to 2016. HHI is Herfindahl-Hirschman Index. pp is percentage points. ^aIndependent variable was not included in the model. *p < 0.10 **p < 0.05 ***p < 0.01

agency decisions, courts will grant the agency deference and require a lower burden of proof than if the attorney general had challenged the merger under antitrust laws in court.

Despite these merger review authority and antitrust laws, our findings reveal that relatively few proposed hospital mergers were challenged under antitrust laws or administrative merger review processes during 2010-19, even though more than 90 percent of MSAs had a highly concentrated hospital market.^{3,14} In that period only 42 of 862 (4.9 percent) proposed hospital mergers were challenged by states or the FTC, with only 12 (1.4 percent) being blocked or abandoned. However, when we examined the thirty-five challenges from states that did not involve the FTC, twenty-five challenges (71.4 percent) originated in the eight states with the most robust merger review authority (categories 6 and 7), resulting in those states challenging 18.0 per-

cent of their proposed mergers, in contrast to states with less merger review authority, which challenged only 1.4 percent of their proposed mergers. Yet hospital market concentration and prices increased at similar rates in category 6 and 7 states compared with other states, potentially because twenty of the twenty-five challenges from those states resulted in merger approvals with conditions that did not address competitive concerns.

Our results suggest that more robust merger approval authority alone will not moderate hospital consolidation and price increases. Although states in categories 6 and 7 challenged a higher share of hospital mergers than other states, these challenges frequently resulted in conditional approval of proposed mergers, allowing the markets to further consolidate, instead of having the mergers be either blocked or approved with conditions that included struc-

tural remedies, such as requiring the merged entity to divest facilities that create risk for anti-competitive harm. In addition, these states often failed to impose conditions to mitigate potential increases in price or diminution in quality resulting from the merger. Instead, many conditions reflected other state priorities, such as ensuring continued access to services for women's reproductive care and vulnerable populations or fulfillment of charitable purposes by nonprofit entities. When conditions did address market power, they often imposed time-limited restrictions that permitted growth in market power but delayed the ability to use it. Although we did not find evidence that merger challenges moderated hospital price increases in these states, retrospective studies could analyze the effects of these challenges on postmerger prices.

Although our findings do not reveal an optimal state merger review authority framework, we contend that the advanced state merger review authority elements—including notification requirements; competition-based merger review criteria; and the power to approve, conditionally approve, or block anticompetitive mergers—may have the potential to improve poorly functioning hospital markets. The frameworks require further study, however, to answer questions such as the following: What aspects of state merger review authority are most effective at deterring and blocking anticompetitive mergers, and which are most effective at mitigating harms arising from consummated mergers? To what extent do state funding and expertise limitations constrain merger review and hospital antitrust enforcement? In what circumstances should states and federal antitrust agencies partner to review proposed mergers? Additional research is needed to understand whether more rigorous use of competition-based enforcement tools, including structural remedies (such as blocking the merger or divestitures) and competitive impact conditions (such as caps on postmerger price increases) can effectively promote competition

and restrain price growth or whether regulatory interventions such as hospital rate setting are required to achieve these goals. The findings from these studies could further equip states to design and implement advanced merger review authority frameworks to address poorly functioning hospital markets.

Conclusion

For state merger reviews to effectively constrain market power, merger challenges need to specifically address the core problem of excessive market concentration by blocking anticompetitive mergers; imposing structural remedies, such as divestitures of facilities; or attaching conditions designed to prevent abuses of market power, such as anticompetitive price increases and anticompetitive contract clauses.³⁴

States could play a critically important role in addressing poorly functioning hospital markets because federal antitrust enforcement is limited by resource constraints, high Hart-Scott-Rodino filing thresholds, less flexible merger review authority, and less knowledge of local market conditions.²⁰ With mounting evidence of the anticompetitive effects of hospital consolidation,² coupled with the increasing trend of consolidation moving beyond horizontal mergers to include vertical and cross-market mergers as well as joint ventures, management contracts, and affiliations,³⁵ having an effective antitrust enforcement framework is imperative. The handful of states that have developed more robust hospital merger review authority—which includes notification requirements; competition-based merger review criteria; and the power to approve, conditionally approve, or block potentially anticompetitive mergers—challenged a higher percentage of hospital mergers than other states. Further study of these states' hospital merger review frameworks can provide insights into improving hospital merger review. ■

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