

# Large Self-insured Employers Lack Power to Effectively Negotiate Hospital Prices

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**F**ifty-five percent of Americans younger than 65 years receive their health insurance from their employers.<sup>1</sup> Recently, hospital prices paid by employers have increased much faster than inflation and outpaced what public payers pay.<sup>2,3</sup> The price differential paid by employers for hospital services increased from 10% above the Medicare rate to more than 100% above the Medicare rate in many metropolitan statistical areas (MSAs) between 2005 and 2019.<sup>4</sup> If the differential between public- and private-sector prices continues to widen, it could continue to cause slower or negative effective wage growth for US workers, whose total compensation increases have been absorbed by more expensive health benefits.<sup>5</sup>

Most large employers are self-insured,<sup>6</sup> meaning that employers bear financial risk for their health plans. Previous research in this area has focused on how insurer concentration could lead to lower private-sector hospital prices.<sup>7,8</sup> However, most insurers are paid through administrative services only (ASO) contracts, do not assume risk, and may not have a direct incentive for lower prices.<sup>9</sup> Insurers may use their entire book of business and compete for potential clients (ie, self-insured employers) by offering them low-premium plans by obtaining low health care prices.<sup>7</sup> However, insurers can also compete for employers based on administrative fees instead of prices, as prices are often not shared with employers during the bidding process. Furthermore, ASO contracts are sometimes paid as a percentage of overall claims,<sup>10,11</sup> which would actually create a negative incentive to negotiate lower prices, or on a per-member per-month basis, which would attenuate the incentive.

Empirically, this has been borne out in the data. A recent National Bureau of Economic Research working paper by Craig et al has examined within-payer price variation at hospitals in Massachusetts,<sup>11</sup> finding that those enrolled in ASO plans pay higher prices for the same services at the same hospital than those enrolled in fully insured plans administered by the same payer. This empirical evidence suggests that insurers, because they lack the incentive, may not be negotiating lower prices for their ASO enrollees. Although insurers benefit from having self-insured employers in their book of business,<sup>7</sup> they may not want to alienate hospitals who are among the largest employers in the community and important potential customers.

## ABSTRACT

**OBJECTIVES:** Self-insured employers cover more people than Medicare, Medicaid, or direct purchasers of private insurance. This study examined the ability of self-insured employers to negotiate hospital prices and the relationship between hospital prices and employer market power in the United States.

**STUDY DESIGN:** Repeated cross-section analysis of commercial claims.

**METHODS:** We used the US Census Bureau County Business Patterns data to estimate employer market power at the metropolitan statistical area (MSA)-year level and used the Truven Health MarketScan commercial claims to estimate mean hospital prices and price ratios at the MSA-year level (2010-2016). We calculated descriptive statistics for employer market power, mean hospitalization prices, and a case mix-adjusted price ratio measure during the study period and analyzed the 10 most concentrated labor markets. We estimated MSA-year-level ordinary least squares regressions of hospitalization price and the price ratio measure on employer market power.

**RESULTS:** Large self-insured employers had concentrated market power in very few MSAs in 2016. The mean value of our employer market power measure was 62 for 2016, compared with the mean value of 5410 for hospital market power in the United States. Regression analyses find a slight relationship: A 1-point increase in employer market power was associated with a \$6.61 decrease in the hospitalization price (mean = \$20,813), but this result becomes statistically insignificant once the models control for hospital wages.

**CONCLUSIONS:** Employer market power is low in most MSAs. Self-insured employers may consider building purchase alliances with state and local government employee groups to enhance their market power and lower negotiated prices for hospital services.

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The growing differential between Medicare and private-sector prices shows that the private health care payment system is not keeping pace with consolidation in the hospital sector.<sup>8,12-15</sup> In response to this growing differential, some large self-insured employers—for example, Berkshire Hathaway, JPMorgan Chase, and Amazon—have created an entity to address the cost of their health care benefits, and some large self-insured employers have begun to directly negotiate prices with hospitals.<sup>9,16,17</sup>

However, the success of these efforts is likely to be a function of employers' negotiating power in health care markets. On one hand, employers may solicit bids from a variety of insurers and work with consultants to choose insurers that pay lower prices. If this is the case, insurers should work to achieve low prices and employer negotiating power should not matter. On the other hand, large employers with significant market power may have some leverage against hospital systems. If ASO insurers are not negotiating lower prices, then an employer's market power could function as a counterforce to provider and insurer market power (eg, the dominant hospital system may want to serve the dominant employer). These large employers may be able to use their market power in negotiations by engaging in direct contracting with providers, demanding that insurers negotiate lower prices, or to remove gag clauses that prevent the employers from seeing the prices up front. There is some evidence of this occurring both in the private sector<sup>18</sup> and the public sector.<sup>16,19</sup> The extent to which this is happening across the country in areas where employers do have market power is unknown, a priori.

In this study, we examined the extent of employer market power in the context of hospital price negotiation and explored whether employers can use their market power to obtain lower prices for hospitalizations. We used Truven MarketScan data to examine inpatient hospital prices across MSAs and constructed a measure of employer market power adapted from the labor economics literature.<sup>20-23</sup> We examined the level of employer market power across MSAs in the United States, identifying markets with particularly high and low levels of employer market power, and examined the association between employer market power and hospital prices.

## STUDY DATA AND METHODS

### Data

We used the US Census Bureau County Business Patterns (CBP) data to estimate employer market power at the MSA level for each year between 2010 and 2016.<sup>24</sup> The CBP data provide annual statistics for all businesses with paid employees within the United States. At a county level, the CBP data provide estimates of the number of firms with the following ranges of employees: 1 to 4, 5 to 9, 10 to 19, 20 to 49, 50 to 99, 100 to 249, 250 to 499, 500 to 999, 1000 to 1499, 1500 to 2499, 2500 to 4999, and 5000 or more.

### TAKEAWAY POINTS

- ▶ In most areas of the United States, self-insured employers lack market power to negotiate hospital prices.
- ▶ There is no evidence that greater employer market power is associated with lower hospital prices in the employer-sponsored insurance markets.
- ▶ Employer coalitions would need to enroll a considerable number of employers to have a sufficient market power to negotiate with hospitals.
- ▶ Self-insured employers may consider building purchase alliances with state and local government employee groups to enhance their market power and lower negotiated prices for hospital services.

We used the Truven Health MarketScan commercial claims and annual enrollment data files, sourced from large employers, for the years 2010-2016 to estimate MSA-year-level prices.<sup>25</sup> The Truven MarketScan data include information from 350 insurers offering private-sector employer-sponsored coverage to approximately 25% of all the commercially insured individuals and their families in the United States. This database has been used to estimate local-level hospital prices in prior research.<sup>26-28</sup>

Additional MSA-year-level characteristics were obtained from the Current Population Survey (CPS), the American Hospital Association (AHA) Annual Survey, and the American Medical Association (AMA) Competition in Health Insurance annual reports. Demographic data and unemployment rates were obtained from CPS at the county level and were aggregated to the MSA-year level. Hospital concentration measures were obtained from AHA at the county level and aggregated to the MSA-year level. Insurer concentration data were available from the AMA reports at an MSA-year level. To adjust hospital prices for local wages in the hospital setting, we used the CMS wage index, a standardized measure of local hospital wages relative to national hospital wages.<sup>29</sup> The CMS wage index is used to adjust prospective payments to hospitals based on local hospital wages and defines labor market areas by Core-Based Statistical Areas, which align with our MSA-year-level analyses.

### Measures

Our key measure was employer market power. The employer market power measure was defined as the sum of the squared market shares in the labor market for each employer (similar to the Herfindahl-Hirschman Index [HHI]),<sup>30</sup> following the literature in labor economics.<sup>20-23</sup> In the labor economics literature, each industry is evaluated separately; however, we aggregated industries for our analysis because the industry is not relevant with respect to hospital prices and negotiations. To later match to the hospital price data, we constructed the employer market power measure at the MSA level. Because labor markets are generally smaller than an MSA, we constructed the employer market power measure at the county level and then took a weighted mean up to the MSA level. Our process followed 3 steps.

First, we estimated the number of employees within a county by assuming that each employer within a range (eg, 5-9) employs the

midpoint of that range (eg, 7.5) and then summed the total employees across firms within a county. For employers reporting 5000 or more employees, we estimated the number of employees by subtracting the estimated number of employees in all the smaller categories from the total number of employees in the county, and then divided by the number of employers with 5000 or more employees.

Second, we took the estimates derived above and calculated a county-level measure of employer market power. A value close to 0 indicates a highly competitive labor market and a value of 10,000 indicates a perfectly monopsonistic employer.

Third, we took the weighted mean of these county-level measures at the MSA level, weighted by the employers' market shares in that MSA, to calculate each MSA's employer market concentration.

Our dependent variable was hospitalization price. We constructed 2 hospitalization price measures using the Truven Health MarketScan commercial claims data for inpatient admissions. First, we computed the mean inpatient hospitalization price for each MSA-year. To account for differences in case mix, we also computed a price ratio measure that controls for differences across markets. Specifically, the expected price in each MSA-year was calculated by multiplying the national prices for each diagnosis-related group (DRG) code by the number of cases for each DRG in that MSA. This price ratio measure accounts for differences in case mix that may otherwise drive differences in prices across markets by adjusting for the local frequency of DRG codes.

### Statistical Analysis

We calculated descriptive statistics, mapped the distribution of employer market power across the country, and analyzed the 10 most concentrated labor markets, focusing on the largest employer in each market. To analyze the descriptive relationship between inpatient prices and employer market power, we estimated MSA-year-level ordinary least squares regressions of hospital prices on employer market power. We estimated these models with year fixed effects to account for time trends, then added market-level controls, and finally added the CMS wage index to the regressions to examine the relative contribution of wages. We estimated models separately with a linear specification of employer market power and with the linear specification plus quartiles of employer market power. The nonlinear specifications are incorporated to test the hypothesis that employer market power is strongest at the highest levels of the distribution, as has been found in prior literature on employer monopsony power and wages.<sup>20-23</sup> We also estimated log-transformed models as a sensitivity check.

We performed 3 key robustness checks. First, to account for the potential endogeneity of employer market power, we estimated an instrumental variable (IV) model where we instrumented MSA-level employer market power with the employer market power of the nearest MSA, identifying the nearest MSA based on the geographic distance between the centroids of MSAs.<sup>31,32</sup> Second, because employers may have more bargaining power in more competitive hospital markets, we estimated a series of models where we interacted employer market power with hospital HHI. Third, markets with significant

employer market power may also have a health care organization as the largest employer, potentially diminishing the association between employer market power and hospital prices. To examine this, we estimated models excluding all 819 (33.0%) MSA-years in which a health care organization was the largest employer.

## RESULTS

In **Table 1**, we show descriptive statistics related to the key measures of employer market power and prices over time. In 2016, the average employer market was very unconcentrated, with a mean (SD) of 61.59 (70.88) and median of 46.27. Overall, labor markets were becoming less concentrated over time, with a mean (SD) of 63.70 (63.37) in 2010 and 61.59 (70.88) in 2016.

The MSA-level mean (SD) hospitalization price in 2016 was \$23,911 (\$6789), with a median (interquartile range) of \$22,377 (\$19,777-\$26,323), consistent with previous MSA-level estimates.<sup>33</sup> The mean hospitalization price increased from \$17,898 in 2010 to \$23,911 in 2016. The price ratio measure, by nature, has a mean close to 1 (mean [SD], 0.98 [0.28] in 2016). In 2016, the price ratio measure ranged from 0.57 to 2.56 (ie, hospitalization prices 43% less than the national mean to 156% higher than the national mean, controlling for case mix).

In the **Figure**, we show the geographic distribution of employer market power across the United States in 2016. Larger, more populous MSAs tended to have less concentrated markets, and smaller, less populous MSAs tended to have more concentrated markets.

**Table 2** displays the MSAs with the 10 highest values of employer market power in 2016, along with select characteristics. Markets with relatively high levels of employer market power were generally smaller cities. The largest employers in the more concentrated MSAs spanned a range of industries but generally fell into 3 categories: large universities (Ithaca, New York; Blacksburg-Christiansburg-Radford, Virginia; Morgantown, West Virginia; and Lafayette-West Lafayette, Indiana); health systems (Rochester, Minnesota; Madera, California; Weirton-Steubenville, West Virginia-Ohio; and Winchester, Virginia-West Virginia); and manufacturing (Sioux City, Iowa-Nebraska-South Dakota; and Kokomo, Indiana). These concentrated MSAs generally had hospital prices lower than the mean but had a wide range: from \$15,319 in Weirton-Steubenville, West Virginia-Ohio, to \$30,140 in Morgantown, West Virginia. Adjusting the prices for the case mix in each MSA, the price ratio measure followed a similar trend. Detailed sources and methods underlying this table can be found in **eAppendix A** (eAppendices available at [ajmc.com](#)).

In **Table 3**, the relationship between hospital prices and employer market power is examined. Panel A of Table 3 presents the relationship with a linear specification of employer market power. Columns 1 through 3 model the mean hospitalization price and employer market power, whereas columns 4 through 6 model the price ratio measure. With and without market-level controls, there was a statistically significant relationship between employer market power and hospitalization prices. Adjusting for market controls, including sex, race/ethnicity, education level, unemployment, insurer HHI, and

hospital HHI, a 1-SD increase in employer market power (ie, a 65-point increase) was associated with a \$430 lower mean hospitalization price. Accounting for differences in differences in case mix, a 1-SD increase in employer market power was associated with 2.1% lower prices. This relationship was substantially weaker and no longer statistically significant after controlling for the CMS hospital wage index, which has an extremely strong relationship with prices. Panel B of Table 3 shows the relationship between hospital prices and employer market power, with a nonlinear specification of employer market power that includes the continuous measure along with a categorical variable for the quartile of employer market power. We find qualitatively similar results. As a sensitivity check, we reestimated our models with log-transformed outcomes (eAppendix B). The results did not qualitatively change.

In eAppendix C, we present results from the IV model. In the first stage, we found a strong *F* statistic of 12.34. The second-stage results were not qualitatively different from the main results presented in Table 3.

eAppendix D displays results interacting employer market power and hospital HHI. We found no statistically significant interaction between these 2 measures, with point estimates around 0.

In eAppendix E, we examined how our results may change when excluding MSA-years in which a health care organization was the largest employer. Although the overall results were unchanged, the association between employer market power and hospital prices was slightly larger, yet still not statistically different from 0 once we controlled for hospital wages.

## DISCUSSION

Our results showed that large, self-insured employers did not have concentrated market power in most MSAs. The mean value of employer market power was 62 for 2016, compared with the mean value of 5410 for hospital market power in the United States.<sup>34</sup> Our regression analyses find a slight (but economically insignificant) negative relationship between employer market power and hospital prices when we estimate models without hospital wage controls, and this result becomes statistically insignificant once the models control for hospital wages. Given these 2 alternate specifications, we do not find evidence that employers are using bargaining power to negotiate lower hospital prices.

**TABLE 1.** Employer Market Power and Hospital Prices, 2010-2016\*

Year	n	Mean	SD	Minimum	25th percentile	Median	75th percentile	Maximum
<b>Employer market power</b>								
2010	360	63.70	63.37	1.645	27.13	47.49	78.32	697.5
2011	360	64.01	61.54	1.670	27.49	48.09	78.91	680.3
2012	360	64.93	67.20	1.651	26.92	48.41	81.97	734.8
2013	360	62.40	57.75	1.674	27.76	48.32	78.67	683.9
2014	360	62.14	61.97	1.658	26.16	47.58	78.37	795.3
2015	360	62.68	72.16	1.541	26.07	47.18	77.16	943.7
2016	360	61.59	70.88	1.433	25.14	46.27	75.58	947.7
<b>Mean hospitalization price (\$)</b>								
2010	354	17,897.68	4628.60	10,634.74	15,098.25	16,859.54	19,734.36	43,721.57
2011	354	18,883.02	5050.41	10,898.51	15,891.20	17,743.74	20,299.43	43,644.87
2012	354	19,740.07	5389.71	11,847.13	16,568.69	18,392.80	21,425.10	47,930.00
2013	354	20,910.27	5254.56	11,379.72	17,403.20	20,029.81	23,305.59	49,541.10
2014	352	21,591.91	6005.33	6941.98	17,919.47	20,573.17	23,774.75	48,979.93
2015	352	22,781.57	6095.18	11,760.05	18,732.53	21,794.33	25,312.21	53,901.64
2016	353	23,910.57	6788.82	12,161.43	19,776.84	22,377.42	26,322.72	62,955.77
<b>Price ratio</b>								
2010	354	0.9976	0.2483	0.6081	0.8409	0.9531	1.0839	2.3570
2011	354	0.9882	0.2366	0.6181	0.8340	0.9367	1.0749	2.1578
2012	354	0.9791	0.2418	0.6233	0.8257	0.9349	1.0618	2.1676
2013	354	0.9692	0.2247	0.5488	0.8208	0.9288	1.0532	2.0175
2014	352	1.0020	0.2760	0.3089	0.8331	0.9647	1.0923	2.3088
2015	352	0.9939	0.2597	0.6029	0.8241	0.9521	1.0813	2.4316
2016	353	0.9797	0.2812	0.5693	0.8025	0.9301	1.0586	2.5649

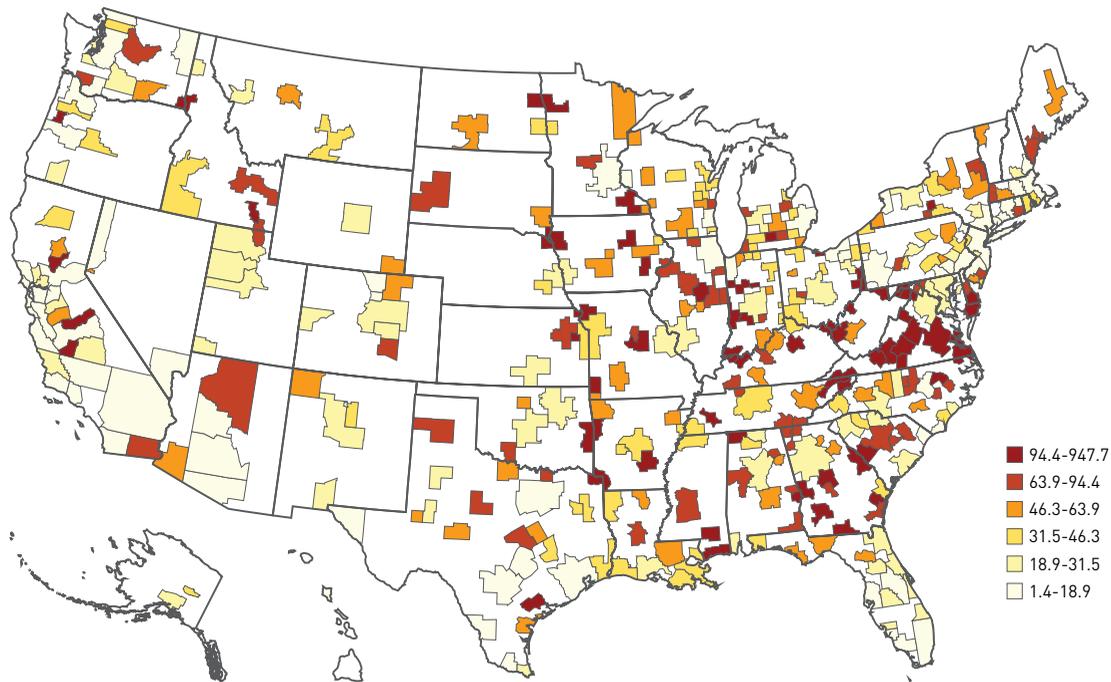
MSA, metropolitan statistical area.

\*Employer market power is defined as the weighted average within an MSA of the county-level sum of squared firm-level market shares. Employer market power was constructed using the County Business Pattern data from the US Census Bureau. Price measures are calculated using the Truven Health MarketScan commercial claims database. The mean hospitalization cost is calculated as the mean total admission cost among all hospitalizations in an MSA-year. The price ratio is the mean hospitalization cost divided by the "expected" hospitalization cost, calculated as a weighted mean of annual national mean costs for each diagnosis-related group code with weights for the frequency of each code in an MSA-year.

It has been suggested that employers should take an active role in negotiating prices with hospitals, rather than relying on ASO insurers to do so.<sup>17</sup> Our study suggests that almost all employers, operating alone, simply do not have the market power to impose a threat of effective negotiation. Given that health insurers have not been effective in negotiating hospital prices, alternative approaches may be needed to constrain hospital prices for self-insured employers.

Instead of directly negotiating prices, some large self-insured employers have adopted other approaches to contain their health care spending, such as directing patients toward centers of excellence,<sup>35</sup> improving incentives for in-network care, offering high-deductible health plans in combination with personal medical accounts,<sup>36</sup> and changing drug formularies to encourage generic drug usage.<sup>37</sup> However, the effectiveness of these tactics can be limited by local market hospital concentration, which forces employers to accept the prices that hospitals charge.

**FIGURE.** Distribution of Employer Market Power Across the United States, 2016<sup>a</sup>



MSA, metropolitan statistical area.

<sup>a</sup>Figure presents the geographic distribution of employer market power. Employer market power is defined as the weighted average within an MSA of the county-level sum of squared firm-level market shares. Employer market power was constructed using the 2016 County Business Pattern data from the US Census Bureau. The color of MSAs in the figure is according to sextiles of the distribution employer market power. N=360 MSAs. White space represents areas not incorporated in MSAs (ie, rural or micropolitan areas).

**TABLE 2.** The 10 MSAs With the Highest Employer Market Power, 2016<sup>a</sup>

MSA	Employer market power	Total population	Largest employer	% of total employment	Mean hospitalization price (\$)	Price ratio
Ithaca, NY	947.75	101,564	Cornell University	16.9	18,296	0.864
Rochester, MN	550.32	207,217	Mayo Clinic	30.8	29,339	1.238
Blacksburg-Christiansburg-Radford, VA	310.49	162,958	Virginia Tech	18.8	23,795	1.045
Madera, CA	294.57	150,865	Children's Hospital	5.9	29,713	1.262
Sioux City, IA-NE-SD	249.94	143,577	Tyson Foods	4.9	21,399	0.810
Gulfport-Biloxi, MS	232.13	371,397	US Navy	3.7	18,016	0.759
Weirton-Steubenville, WV-OH	219.12	124,454	Trinity Health Systems	5.4	15,319	0.575
Kokomo, IN	198.76	98,688	Fiat Chrysler Automobiles	20.2	23,644	0.908
Morgantown, WV	188.72	129,709	West Virginia University	12.0	30,140	1.065
Lafayette-West Lafayette, IN	175.92	201,789	Purdue University	19.9	23,979	1.044

MSA, metropolitan statistical area.

<sup>a</sup>Employer market power is defined as the weighted average within an MSA of the county-level sum of squared firm-level market shares. Employer market power was constructed using the 2016 County Business Pattern data from the US Census Bureau. Total population estimates are according to the 2010 United States Census. <sup>e</sup>Appendix A outlines determination of largest employer within an MSA and total employees for that largest employer. Total employment within an MSA is from the 2016 Occupational Employment Statistics data from the US Bureau of Labor Statistics. Price measures are calculated using the 2016 Truven Health MarketScan commercial claims database. The mean hospitalization cost is calculated as the mean total admission cost among all hospitalizations in an MSA in 2016. The price ratio is the mean hospitalization cost divided by the "expected" hospitalization cost, calculated as a weighted mean of 2016 national mean costs for each diagnosis-related group code with weights for the frequency of each code in an MSA in 2016.

**TABLE 3.** Relationship Between Inpatient Prices and Employer Market Power\*

	(1) Mean hospitalization price (\$)	(2) Mean hospitalization price (\$)	(3) Mean hospitalization price (\$)	(4) Price ratio	(5) Price ratio	(6) Price ratio
<b>Panel A: Linear models</b>						
Employer market power	-12.53*** (4.29)	-6.61** (3.28)	-0.81 (2.34)	-0.00067** (0.00026)	-0.00033** (0.00014)	-0.00005 (0.00009)
Hospital wage index			22,183.22*** (2405.23)			1.04407*** (0.09853)
Observations	2473	2473	2464	2473	2473	2464
R <sup>2</sup>	0.13	0.36	0.53	0.03096	0.32347	0.52932
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Market controls	No	Yes	Yes	No	Yes	Yes
Wage index	No	No	Yes	No	No	Yes
Dependent variable mean	20,813	20,813	20,813	0.987	0.987	0.987
<b>Panel B: Nonlinear models</b>						
Employer market power	-2.91 (3.17)	-5.96 (4.05)	-1.67 (2.62)	-0.00003 (0.00014)	-0.00023 (0.00016)	-0.00003 (0.00010)
Employer market power quartile (reference: first)						
Second	-2521.53*** (852.17)	-986.90 (729.27)	-578.42 (530.86)	-0.12892*** (0.03809)	-0.04981 (0.03228)	-0.03095 (0.02290)
Third	-3325.43*** (841.71)	-1264.07* (762.64)	-735.13 (586.36)	-0.17776*** (0.03814)	-0.06639* (0.03437)	-0.04194 (0.02579)
Fourth	-3112.46*** (929.75)	-874.06 (867.14)	-202.96 (667.03)	-0.19321*** (0.04105)	-0.05978 (0.03840)	-0.02797 (0.02913)
Hospital wage index			22,099.23*** (2360.08)			1.03827*** (0.09664)
Observations	2473	2473	2464	2473	2473	2464
R <sup>2</sup>	0.17	0.37	0.53	0.09426	0.32882	0.53160
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Market controls	No	Yes	Yes	No	Yes	Yes
Wage index	No	No	Yes	No	No	Yes
Dependent variable mean	20,813	20,813	20,813	0.987	0.987	0.987

HHI, Herfindahl-Hirschman Index; MSA, metropolitan statistical area.

\*P < .1; \*\*P < .05; \*\*\*P < .01.

\*Models progressively add control variables. Models (1) and (4) include only year fixed effects. Models (2) and (4) add market-level controls. Models (3) and (6) add the wage index control. Employer market power is defined as the weighted average within an MSA of the county-level sum of squared firm-level market shares. Employer market power was constructed using the 2010–2016 County Business Pattern data from the US Census Bureau. Price measures are calculated using the 2010–2016 Truven Health MarketScan commercial claims database. The mean hospitalization cost is calculated as the mean total admission cost among all hospitalizations in an MSA-year. The price ratio is the mean hospitalization cost divided by the “expected” hospitalization cost, calculated as a weighted mean of annual national mean costs for each diagnosis-related group code with weights for the frequency of each code in an MSA-year. The hospital wage index is calculated as the weighted mean of the Medicare Wage Index for each hospital in an MSA-year, weighted by the mean daily census of each hospital. Market controls include sex, race/ethnicity, education level, unemployment, insurer HHI, and hospital HHI. Standard errors are clustered at an MSA level and are in parentheses.

Creating purchasing alliances is another strategy for employers to increase their purchasing power.<sup>38</sup> To be an effective negotiator, such purchasing alliances need to have substantial market power in their geographic area. In most MSAs, achieving substantial market power would require that many large employers would all agree on the same approach. Achieving this level of collective action may be a challenge; in many cities, the combined market share of major employers is relatively small. One approach that may hold promise is creating purchase alliances of private and public employee groups,<sup>39</sup> which can take a more active role in negotiating with hospitals using their combined large market share.

### Limitations

This study had several important limitations. First, our analysis was not causal. Instead, we focused on the descriptive nature of employer market power and the descriptive relationship between employer market power and hospital prices. Second, we estimated our analysis at the MSA level, as the MarketScan data do not have finer geography. Although some prior studies have measured employer market power at the commuting zone–industry level,<sup>20–23</sup> we believe that an MSA-level analysis is appropriate as it has been used in prior studies of hospital prices<sup>26,40–42</sup> and because the employer’s total market share, not their market share within a geographic market–industry

combination, should be key in price negotiations. Third, we were not able to observe which employers were specifically included in the MarketScan data. Although the MarketScan data are sourced from large employers, there could be markets in which the largest employer is not included. This may bias the descriptive relationship between employer market power and inpatient prices toward a null result of no relationship. However, in 7 of the 10 most concentrated markets, we found that MarketScan enrollment substantially exceeded the estimated number of employees at the largest employer, enhancing the credibility of our estimates.

## CONCLUSIONS

This study examined inpatient hospital prices and employer market power across the United States between 2010 and 2016. Employer market power was low in most MSAs, a potential explanation for why employers historically have not taken a more active role in price negotiation. Employer coalitions would need to enroll a considerable number of employers to have a sufficient market power to negotiate with hospitals. Self-insured employers may consider building purchase alliances with state and local government employee groups to enhance their market power and negotiate lower prices for hospital services. ■

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## eAppendix

### **eAppendix A.** Sources for Largest Employers in MSAs With the Highest Employer Market Power

<b>MSA</b>	<b>Source</b>	<b>Notes</b>
Ithaca, NY	City-Data.com. Ithaca: Economy [Internet]. 2019 [cited 27 August 2019]. Available from: <a href="http://www.city-data.com/us-cities/The-Northeast/Ithaca-Economy.html">http://www.city-data.com/us-cities/The-Northeast/Ithaca-Economy.html</a>	
Rochester, MN	RAEDI.com, Major Employers in the Rochester Area [Internet]. 2019 [cited 6 December 2019]. Available from: <a href="http://www.raedi.com/doing-business-here/major-employers.php">http://www.raedi.com/doing-business-here/major-employers.php</a>	
Blacksburg-Christiansburg-Radford, VA	Virginia Employment Commission. Top 50 Employers [Internet]. 2017 [cited 27 August 2019]. Available from: <a href="http://yesmontgomeryva.org/content/119/153/default.aspx">http://yesmontgomeryva.org/content/119/153/default.aspx</a>	According to website, 5,000 or more employees are employed by Virginia Tech. For the purposes of our labor share calculation, we assumed 5,000 employees.
Madera, CA	Madera County Economic Development Commission. Business Profile [Internet]. 2019 [cited 27 August 2019]. Available from: <a href="https://centralcalifornia.org/location-advantages/madera-county/">https://centralcalifornia.org/location-advantages/madera-county/</a>	
Sioux City, IA-NE-SD	Sioux City Economic Development Department. Leading Employers [Internet]. 2019 [cited 27 August 2019]. Available from: <a href="https://locatesiouxcity.com/leading-employers">https://locatesiouxcity.com/leading-employers</a>	
Gulfport-Biloxi, MS	Gulfport-ms.gov. City of Gulfport, Mississippi. 2014 [cited 6 December 2019]. Available from: <a href="http://www.gulfport-ms.gov/Finance/CAFR2014.pdf">http://www.gulfport-ms.gov/Finance/CAFR2014.pdf</a>	
Weirton-Steubenville, WV-OH	Paul J. Gough. Top 5: Steubenville-Weirton region's employers [Internet]. 2019 [cited 27 August 2019]. Available from: <a href="https://www.bizjournals.com/pittsburgh/slideshow/2014/11/21/top-5-largest-employers-in-steubenville-weirton.html">https://www.bizjournals.com/pittsburgh/slideshow/2014/11/21/top-5-largest-employers-in-steubenville-weirton.html</a>	
Kokomo, IN	Greater Kokomo Development Alliance. Major Employers [Internet]. 2019 [cited 27 August 2019]. Available from: <a href="https://www.greaterkokomo.com/economic-development/major-employers">https://www.greaterkokomo.com/economic-development/major-employers</a>	According to website, 8,000 or more employees are employed by Fiat Chrysler Automobiles. For the purposes of our labor share calculation, we assumed 8,000 employees.

Morgantown, WV	It's Morgantown. Morgantown Area Top Employers [Internet]. 2019 [cited 27 August 2019]. Available from: <a href="https://www.itsmorgantown.com/resources/top-employers/">https://www.itsmorgantown.com/resources/top-employers/</a>	
Lafayette-West Lafayette, IN	Center for Regional Development. Data Snapshot: Tippecanoe County [Internet]. 2015 [cited 27 August 2019]. Available from: <a href="https://www.slideshare.net/PCRD/tippecanoe-county-snapshot">https://www.slideshare.net/PCRD/tippecanoe-county-snapshot</a>	

**eAppendix B.** Relationship Between Log-Transformed Inpatient Prices and Employer Market Power

	(1)	(2)	(3)	(4)	(5)	(6)
	Log(Average hospitalization price)	Log(Average hospitalization price)	Log(Average hospitalization price)	Log(Price ratio)	Log(Price ratio)	Log(Price ratio)
<i>Panel A: Linear models</i>						
EMP	-0.00054*** (0.00018)	-0.00028* (0.00015)	-0.00006 (0.00011)	-0.00062** (0.00025)	-0.00029** (0.00013)	-0.00005 (0.00009)
Hospital wage index			0.83676*** (0.07576)			0.87910*** (0.06719)
Observations	2,473	2,473	2,464	2,473	2,473	2,464
R-squared	0.15222	0.36550	0.49706	0.03123	0.30392	0.48055
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Market controls	No	Yes	Yes	No	Yes	Yes
Wage index	No	No	Yes	No	No	Yes
Dependent variable mean	9.909	9.909	9.909	-0.0412	-0.0412	-0.0412
<i>Panel B: Non-linear models</i>						
EMP	-0.00012 (0.00015)	-0.00023 (0.00018)	-0.00007 (0.00013)	0.00000 (0.00014)	-0.00019 (0.00016)	-0.00001 (0.00011)
EMP quartile (ref. = first)						
Second	-0.09712*** (0.03255)	-0.03476 (0.02860)	-0.01968 (0.02200)	-0.11015*** (0.03134)	-0.03914 (0.02738)	-0.02380 (0.02039)
Third	-0.13905*** (0.03296)	-0.05374* (0.03113)	-0.03440 (0.02513)	-0.16100*** (0.03217)	-0.05730* (0.03023)	-0.03763 (0.02385)
Fourth	-0.12973*** (0.03797)	-0.03813 (0.03654)	-0.01291 (0.02974)	-0.18078*** (0.03583)	-0.05424 (0.03459)	-0.02735 (0.02761)
Hospital wage index			0.83290*** (0.07453)			0.87390*** (0.06641)
Observations	2,473	2,473	2,464	2,473	2,473	2,464
R-squared	0.18761	0.36889	0.49880	0.09357	0.30853	0.48257
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Market controls	No	Yes	Yes	No	Yes	Yes
Wage index	No	No	Yes	No	No	Yes
Dependent variable mean	9.909	9.909	9.909	-0.0412	-0.0412	-0.0412

Notes: Employer Market Power (EMP) is defined as the weighted average within an MSA of the county-level sum of squared firm-level market shares. Employer Market Power was constructed

using the 2010-2016 County Business Pattern data from the United States Census Bureau. Price measures are calculated using the 2010-2016 Truven Health MarketScan® commercial claims database. The average hospitalization cost is calculated as the average total admission cost among all hospitalizations in an MSA-year. The price ratio is the average hospitalization cost divided by the “expected” hospitalization cost, calculated as a weighted average of annual national average costs for each DRG code with weights for the frequency of each code in an MSA-year. Outcome measures were log-transformed in this analysis. The hospital wage index is calculated as the weighted average of the Medicare Wage Index for each hospital in an MSA-year, weighted by the average daily census of each hospital. Market controls include sex, race/ethnicity, education level, unemployment, insurer HHI, and hospital HHI. Standard errors are clustered at an MSA level and are in parentheses. \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ .

**eAppendix C. Instrumental Variable Analysis of Relationship Between Hospital Wages and Employer Market Power**

	(1) Average hospitalization price (\$)	(2) Average hospitalization price (\$)	(3) Average hospitalization price (\$)	(4) Price ratio	(5) Price ratio	(6) Price ratio
EMP	-61.97*** (18.61)	-34.78 (33.08)	24.45 (25.24)	-0.00286*** (0.00082)	-0.00149 (0.00135)	0.00131 (0.00108)
Hospital wage index			23,847.57*** (3,403.86)			1.12947*** (0.14476)
Observations	2,473	2,473	2,464	2,473	2,473	2,464
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Market controls	No	Yes	Yes	No	Yes	Yes
Wage index	No	No	Yes	No	No	Yes
Dependent variable mean	20,813	20,813	20,813	0.987	0.987	0.987
First stage coefficient	0.145	0.081	0.068	0.145	0.081	0.068
First stage F-statistics	3.24	11.19	11.15	3.24	11.19	11.15

Notes: Employer Market Power (EMP) is defined as the weighted average within an MSA of the county-level sum of squared firm-level market shares. Employer Market Power was constructed using the 2010-2016 County Business Pattern data from the United States Census Bureau. The EMP of the nearest MSA, based on geographic distance from the centroid of the MSA, was used to instrument for EMP. Geographic boundaries of MSAs were determined from the Cartographic Boundary Files from the United States Census Bureau. A first stage single linear regression, with standard errors clustered at the MSA level, of EMP on the EMP of the nearest neighbor yielded a coefficient of 0.131 with a F-statistic of 12.34. Price measures are calculated using the 2010-2016 Truven Health MarketScan® commercial claims database. The average hospitalization cost is calculated as the average total admission cost among all hospitalizations in an MSA-year. The price ratio is the average hospitalization cost divided by the “expected” hospitalization cost, calculated as a weighted average of annual national average costs for each DRG code with weights for the frequency of each code in an MSA-year. The hospital wage index is calculated as the weighted average of the Medicare Wage Index for each hospital in an MSA-year, weighted by the average daily census of each hospital. Market controls include sex, race/ethnicity, education level, unemployment, insurer HHI, and hospital HHI. Standard errors are clustered at an MSA level and are in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

**eAppendix D.** Relationship Between Inpatient Prices and Employer Market Power, Interacted With Hospital Market Power

	(1) Average hospitalization price (\$)	(2) Average hospitalization price (\$)	(3) Price ratio	(4) Price ratio
<i>Panel A: Linear models</i>				
EMP	-14.01 (10.88)	0.17 (10.35)	-0.00072 (0.00045)	-0.00007 (0.00042)
EMP*Hospital HHI (0-10)	0.92 (1.32)	-0.12 (1.16)	0.00005 (0.00005)	0.00000 (0.00005)
Hospital wage index		22,192.23*** (2,405.47)		1.04393*** (0.09856)
Observations	2,473	2,464	2,473	2,464
R-squared	0.36	0.53	0.32421	0.52932
Year FE	Yes	Yes	Yes	Yes
Market controls	Yes	Yes	Yes	Yes
Wage index	No	Yes	No	Yes
Dependent variable mean	20,813	20,813	0.987	0.987
<i>Panel B: Non-linear models</i>				
EMP	-9.64 (12.95)	0.99 (13.72)	-0.00032 (0.00056)	0.00016 (0.00060)
EMP quartile (ref. = first)				
Second	-946.94 (731.36)	-606.88 (547.91)	-0.04884 (0.03222)	-0.03300 (0.02361)
Third	-1,193.20 (787.23)	-785.75 (645.05)	-0.06467* (0.03548)	-0.04561 (0.02845)
Fourth	-754.62 (933.81)	-288.95 (809.97)	-0.05689 (0.04203)	-0.03419 (0.03635)
EMP*Hospital HHI (0-10)	0.41 (1.41)	-0.30 (1.41)	0.00001 (0.00006)	-0.00002 (0.00006)
Hospital wage index		22,111.34*** (2,364.25)		1.03914*** (0.09682)
Observations	2,473	2,464	2,473	2,464
R-squared	0.37	0.53	0.32885	0.53172
Year FE	Yes	Yes	Yes	Yes

Market controls	Yes	Yes	Yes	Yes
Wage index	No	Yes	No	Yes
Dependent variable mean	20,813	20,813	0.987	0.987

Notes: Employer Market Power (EMP) is defined as the weighted average within an MSA of the county-level sum of squared firm-level market shares. Employer Market Power was constructed using the 2010-2016 County Business Pattern data from the United States Census Bureau. Price measures are calculated using the 2010-2016 Truven Health MarketScan® commercial claims database. The average hospitalization cost is calculated as the average total admission cost among all hospitalizations in an MSA-year. The price ratio is the average hospitalization cost divided by the “expected” hospitalization cost, calculated as a weighted average of annual national average costs for each DRG code with weights for the frequency of each code in an MSA-year. The hospital wage index is calculated as the weighted average of the Medicare Wage Index for each hospital in an MSA-year, weighted by the average daily census of each hospital. Market controls include sex, race/ethnicity, education level, unemployment, insurer HHI, and hospital HHI. Standard errors are clustered at an MSA level and are in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

**eAppendix E. Relationship Between Inpatient Prices and Employer Market Power in Markets  
Where Hospital Is Not the Largest Employer**

	(1) Average hospitalization price (\$)	(2) Average hospitalization price (\$)	(3) Average hospitalization price (\$)	(4) Price ratio	(5) Price ratio	(6) Price ratio
<i>Panel A: Linear models</i>						
EMP	-14.72*** (5.52)	-8.40*** (2.75)	-1.37 (2.58)	-0.00072** (0.00033)	-0.00039*** (0.00012)	-0.00006 (0.00010)
Hospital wage index			23,801.60*** (2,441.50)			1.09117*** (0.10130)
Observations	1,657	1,657	1,650	1,657	1,657	1,650
R-squared	0.13	0.39	0.58	0.03574	0.34446	0.57712
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Market controls	No	Yes	Yes	No	Yes	Yes
Wage index	No	No	Yes	No	No	Yes
Dependent variable mean	20,813	20,813	20,813	0.987	0.987	0.987
<i>Panel B: Non-linear models</i>						
EMP	-6.36*** (2.28)	-9.05*** (2.36)	-2.53 (2.53)	-0.00017 (0.00013)	-0.00036*** (0.00011)	-0.00006 (0.00011)
EMP quartile (ref. = first)						
Second	-2,914.83*** (1,076.72)	-1,280.16 (969.36)	-843.58 (672.70)	-0.14382*** (0.04772)	-0.06075 (0.04223)	-0.04135 (0.02847)
Third	-3,755.12*** (1,048.20)	-1,120.81 (954.95)	-316.57 (682.84)	-0.19852*** (0.04717)	-0.06388 (0.04292)	-0.02818 (0.02971)
Fourth	-3,072.44*** (1,129.11)	-683.59 (1,052.39)	-178.82 (832.88)	-0.18668*** (0.05034)	-0.05188 (0.04669)	-0.02881 (0.03596)
Hospital wage index			23,736.19*** (2,386.25)			1.08633*** (0.09899)
Observations	1,657	1,657	1,650	1,657	1,657	1,650
R-squared	0.18	0.39	0.58	0.10809	0.35016	0.57941
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Market controls	No	Yes	Yes	No	Yes	Yes
Wage index	No	No	Yes	No	No	Yes
Dependent variable mean	20,813	20,813	20,813	0.987	0.987	0.987

Notes: Employer Market Power (EMP) is defined as the weighted average within an MSA of the county-level sum of squared firm-level market shares. Employer Market Power was constructed using the 2010-2016 County Business Pattern data from the United States Census Bureau. Price measures are calculated using the 2010-2016 Truven Health MarketScan® commercial claims database. The average hospitalization cost is calculated as the average total admission cost among all hospitalizations in an MSA-year. The price ratio is the average hospitalization cost divided by the “expected” hospitalization cost, calculated as a weighted average of annual national average costs for each DRG code with weights for the frequency of each code in an MSA-year. The hospital wage index is calculated as the weighted average of the Medicare Wage Index for each hospital in an MSA-year, weighted by the average daily census of each hospital. Market controls include sex, race/ethnicity, education level, unemployment, insurer HHI, and hospital HHI. 819 (33.0%) MSA-years were excluded from this analysis if a hospital was the largest employer in the MSA. Standard errors are clustered at an MSA level and are in parentheses. \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ .