Indiana Hospitals Do Not Have a "Monopoly Problem"

By Paul Wong, Ph.D. and Yun Ling, Ph.D.

29 October 2019

Contents

1.   Introduction

A recent policy brief by Dr. Michael J. Hicks at the Center for Business and Economic Research ("CBER") at Ball State University concluded that Indiana has a "monopoly problem in healthcare" and that hospitals, in particular, "exhibit broad signs of monopolization."[1] Further, the brief concludes noting that "Indiana's hospital and healthcare provider network are anti-competitive" and recommends a large number of new regulations and taxes be imposed on Indiana hospitals.

We review the evidence on hospital concentration presented in that brief and used to conclude that Indiana hospitals face a "monopoly problem." We then offer our own analysis of Indiana hospital concentration.[2] Based on our analysis – which includes data and methods more commonly used in antitrust matters involving hospitals – we find the following:

1. The measure of hospital concentration used in the CBER brief provides a misleading and incorrect overview of Indiana hospitals. The CBER brief uses the number of independent hospitals per 100,000 residents, but this measure incorrectly excludes the majority of hospitals and, thus, the vast majority of competition. As a prominent example, the CBER measure depicts the Indianapolis area (i.e., Indiana's largest urban center) as being among the most concentrated, when a conventional measure of concentration – Herfindahl-Hirschman Index ("HHI")[3] – shows the exact opposite. Around the state, the average level of concentration in Indiana is approximately 2,800 when measured using the HHI, roughly consistent with a level that could be found in a market with four or five main competitors.[4]

2. Indiana hospital concentration is similar to the rest of the United States. Our results show no indication that Indiana hospitals face significantly fewer competitors than other similarly situated hospitals around the country.

3. The few highly concentrated areas we do find in Indiana using HHI show no obvious indication of anticompetitive conditions among Indiana hospitals. Exclusively, these concentrated areas are rural communities in Indiana, and both economists and policymakers recognize that the most likely causes of concentration in these areas are unrelated to anticompetitive or unlawful conduct.

Overall, we find no compelling results in our own analysis that support the conclusions and policy recommendations offered in the CBER brief. Competition among Indiana hospitals appears to be no less numerous than is the norm in the United States. Moreover, we worry that some of the policy recommendations made in the CBER brief, such as disintegration of established hospital systems and

---

[1] Hicks, Michael J. "Indiana has a Monopoly Problem in Healthcare; Preliminary evidence and recommendations." Policy Brief, Center for Business and Economic Research, Ball State University (September 25, 2019).

[2] We focus on reviewing and analyzing hospital concentration in Indiana in this report. As we explain, analysis of market concentration is a logical starting point for studying any potential "monopoly problem" and market concentration is one of the measures the CBER brief focuses on. There are, however, multiple other analyses in the CBER brief that appear to be significantly flawed but which are beyond the scope of this article. For example, an overall net "profit rate" of 49% for any hospital is implausible based on our experience and work with healthcare providers around the country. We understand that the Indiana Hospital Association and others have addressed some of the flaws with these other analyses presented in the CBER brief.

[3] U.S. Department of Justice and the Federal Trade Commission. *Horizontal Merger Guidelines*. August 19, 2010. See Section 5.3 ("The agencies often calculate the Herfindahl-Hirschman Index ("HHI") of market concentration").

[4] For example, market shares of four competitors (35%, 35%, 15%, and 15%) will generate an HHI of 2,900, and market shares of five competitors (45%, 25%, 10%, 10%, and 10%) will generate an HHI of 2,950.

added taxation that would burden rural Indiana hospitals, would likely harm rather than improve Indiana hospital competition in the future.

2. The General Economic Approach to Analyzing Indiana Hospital Concentration

Healthcare is an important sector of the U.S. economy, and it is well agreed among economists and policy makers that lower cost, higher quality healthcare is an important policy goal. Likewise, it is generally well agreed that greater competition in healthcare – be it hospitals, physicians, insurers, or pharmaceuticals – will help in realizing these goals and, ultimately, benefit end consumers. Thus, we take no exception to the start of the CBER policy brief, which notes these important motivations.

Many economic studies look to measures of market concentration as a starting point for analyzing competition.[5] More generally, various measures of market structure, such as market share, HHI, and the number of firms, are often observable, objective data points that can help in performing an initial assessment of competition. It is well established economic theory that, *ceteris paribus*, we are more likely to find anticompetitive behavior and diminished market performance in markets with high concentration and/or a single firm with high market share.[6] Thus, we also take no exception to looking to measures of market concentration to begin a study of competition, as is done in the CBER brief.

That is, however, largely the point where our agreement with the findings in the CBER brief ends. As is commonly the case among economists, we view measures of market concentration as an initial starting point and emphasize that a more complete analysis is needed to provide conclusive evidence of anticompetitive behavior by any one firm in any specific setting. Notably, federal antitrust agencies recognize this very same reality, and they too emphasize the importance of looking at a variety of other factors in making a determination.[7] Any one market or series of markets may be highly concentrated for a variety of reasons wholly unrelated to anticompetitive conduct, such as the size of the market(s) in question, the economies of scale and scope in the industry, and the rate of innovation and changes firms face.[8] Thus, as we discuss below, we disagree with the conclusions in the CBER brief concerning Indiana's "monopoly problem," as those conclusions appear to be based on misleading calculations and

---

[5] See, e.g., Gaynor, Martin, Kate Ho, and Robert J. Town. "The Industrial Organization of Health-Care Markets." *Journal of Economic Literature* 53.2 (2015): 235-84. See Section 3.1 ("An obvious question is what initiated this wave of hospital consolidation.").

[6] Schmalensee, Richard, et al., eds. *Handbook of Industrial Organization*. Vol. 2. Elsevier, 1989. See Chapter 17 by Timothy Bresnahan at p. 1043 ("almost all theories of oligopoly [predict] that higher concentration causes higher price-cost margins by changing conduct").

[7] *Supra*, n. 3 at Section 5.3 ("The purpose of these [market concentration] thresholds is not to provide a rigid screen to separate competitively benign mergers from anticompetitive ones, although high levels of concentration do raise concerns. Rather, they provide **one way to identify some mergers unlikely to raise competitive concerns and some others for which it is particularly important to examine whether other competitive factors confirm, reinforce, or counteract the potentially harmful effects of increased concentration.** The higher the post-merger HHI and the increase in the HHI, the greater are the Agencies' potential competitive concerns and the greater is the likelihood that the Agencies will request additional information to conduct their analysis.") (emphasis added).

[8] *Supra,* n. 6 at pp. 1043-1044 (offering some examples of the way market structure and prices may be governed by other factors unrelated to anticompetitive conduct). See, also, Armstrong, Mark, and Robert H. Porter, eds. *Handbook of Industrial Organization*. Vol. 3. Elsevier, 2007, Chapter 29 by Steven Berry and Peter Reiss at pp. 1848-1849 (discussing the large number of factors that dictate equilibrium market structure).

cut against a significant amount of economic literature studying competition and the determinants of market structure.

3.   Data and Methods

Our analysis of Indiana hospitals relies on data commonly used in the economic literature and in antitrust matters involving hospitals.[9] Our calculations of hospital concentration first replicate those in the CBER brief (number of unaffiliated hospitals per capita) but then turn to the conventional measure that is frequently used in antitrust analysis (HHI).

3.1.   Data

We mainly draw from three data sources: the American Hospital Association ("AHA"), Indiana Hospital Association's ("IHA") inpatient discharge database, and the U.S. Census Bureau ("Census"). First, the AHA annually surveys every hospital in the United States, and its database of hospital characteristics is commonly used in the economic literature. We use these data principally to track hospital affiliations (i.e., the integrated system each hospital belongs to, if any), the type of each hospital (e.g., to separate acute care and psychiatric facilities), and the annual total admissions of each hospital for use in some of our HHI calculations. Second, as is the case in many other states, the IHA collects data on all inpatient encounters ("discharges") from each Indiana hospital and maintains a database of these on behalf of Indiana Department of Health. These data are restricted due to HIPAA-privacy regulations but are publicly available records that many academic and government researchers use routinely. We use these data for the more detailed HHI calculations we present, as the data show information such as patients' residences (at the zip code level), the insurance coverage of the patient (e.g., Medicare versus commercial insurance), and medical information (e.g., the MS-DRG for each discharge). Finally, Census data provide population and geographic information, such as the definitions of core-based statistical areas (CBSAs) and combined statistical areas (CSAs).

The variety of data is important because each dataset has different strengths and weaknesses. The AHA data are national in scope, so they are needed when we compare Indiana to the rest of the United States. The AHA data are aggregated, however, so they lack the detail needed to refine our calculations of hospital concentration. The IHA data provide the necessary detail for more precise calculations, but they only cover Indiana by definition, so they cannot be used in comparing Indiana to the rest of the United States. We move between these datasets as necessary.

In this report, we specifically focus our analysis on acute care hospitals, as is typical in antitrust matters involving hospitals.[10] These hospitals account for the vast majority of hospitals in Indiana and the rest of

---

[9] See, e.g., Garmon, Christopher. "The Accuracy of Hospital Merger Screening Methods." *The RAND Journal of Economics* 48.4 (2017): 1068-1102. See Section 4 for a discussion of data from the American Hospital Association and various state inpatient discharge databases. The data we use here are equivalent to the data used in this report.

[10] See, e.g., *Federal Trade Commission and State of Illinois v. Advocate Health Care Network, et al.*, No. 15-cv-11473 (N.D.Ill. 2015), Complaint, p. 11 ("The relevant service market is GAC inpatient hospital services sold and provided to commercial payers and their insured members, respectively."); *Federal Trade Commission and Commonwealth of Pennsylvania v. Penn State Hershey Medical Center and Pinnacle Health System*, No. 1:15-cv-02362-JEJ (M.D.Pa. 2015), Complaint, p. 10 ("The relevant service market in which to analyze the effects of the Merger is GAC inpatient hospital services sold to commercial health plans and their members."); *United States of America and the State or North Carolina v. The Charlotte-Mecklenburg Hospital Authority*, No. 3:16-cv-00311-RJC-DCK (W.D.N.C. 2016), Complaint, p. 6 ("The sale of general acute care inpatient hospital services to insurers ("acute inpatient hospital services") is a relevant product market."); *People of the State of California v. Sutter Health*, No. CGC-18-565398 (Sup. Court of Calif. San Francisco 2018), Complaint, p. 22 ("The relevant market in this action is the cluster of general acute care hospital services").

the United States. Additionally, where it is relevant, we focus our analysis on commercially insured,[11] acute care,[12] Indiana patients,[13] as is also typical in antitrust matters involving hospitals.[14] Acute care patients, likewise, account for the majority of inpatient hospitalizations in Indiana and the rest of the United States. Commercially insured patients are the typical focus of antitrust agencies and antitrust cases, as hospitals compete for these patients along a number of dimensions (e.g., price and quality), whereas hospitals compete for other patients along a more limited set of dimensions (e.g., Medicare and Medicaid pricing are generally fixed and not a dimension of competition for hospitals).[15]

3.2. Methods

We first replicate the measure of hospital concentration presented in the CBER policy brief: the number of *unaffiliated hospitals per 100,000 residents* in each Affordable Care Act ("ACA") rating area. This measure is straightforward to compute using the AHA data, which list each hospital's affiliation, if any, and the Census data, which show the population for each rating area.

The CBER brief explains that this measure is "one of a number of measures of concentration, which is useful in comparing markets with different population sizes, and uncertain market shares." As both a theoretical and practical matter, we are puzzled by this reasoning. If one is hoping to study competition among hospitals generally, a measure that excludes all system-affiliated hospitals will ignore the vast majority of competition.[16] The CBER brief acknowledges that "insurers or patients facing multiple choices of local healthcare providers enjoy some level of competition," and yet the proposed measure excludes most of these choices. Furthermore, even if system-affiliated hospitals have higher pricing and are somehow inferior choices for consumers – a set of assumptions that we question – it is still incorrect theoretically and practically to ignore these hospitals and assume they are irrelevant to a study of competition. Thus, the measure has – at best – a severely flawed and limited economic meaning when it comes to analyzing hospital competition. Finally, as a matter of basic arithmetic, the ability of this measure to accurately summarize hospital concentration is limited – unaffiliated hospitals are often smaller than system-affiliated hospitals, and a simple count of unaffiliated hospitals will inevitably miss instances in which most patient volume (i.e., market share) is concentrated in a small number of hospitals.

As an alternative, we compute the HHI as a measure of hospital concentration.[17] This is by far the most common measure of concentration that is used throughout the economic literature and by antitrust agencies around the world. Our calculation of this measure is conventional – the sum of the squared market shares – and it closely follows what is typically done in antitrust matters involving hospitals.[18] As a practical matter, the usefulness of HHI is fairly apparent. It is simple to compute with the available data, and it is widely used and, thus, somewhat comparable to many other cases. And, as a theoretical matter,

---

[11] We define commercially insured as patients with a primary payor of "commercial insurance," which excludes Medicare, Medicaid, other government programs, self-pay, and unknown payors.

[12] Acute care inpatient discharges exclude normal newborn, mental health, substance abuse, and rehabilitation MS-DRGs.

[13] For simplicity, the small number of out-of-state residents that visit the average Indiana hospital are excluded from our analysis.

[14] *Supra*, n. 10. See, e.g., *Advocate*, Complaint, p. 12 ("the GAC inpatient hospital services market excludes services related to psychiatric care, substance abuse, and rehabilitation services.")

[15] *Supra*, n. 10.

[16] Hospitals in systems of two or more facilities account for 69% of Indiana hospitals and 65% of hospitals in the United States.

[17] *Supra*, n. 3.

[18] *Supra*, n. 10.

the economic meaning of HHI is also fairly apparent. HHI – as compared with the CBER measure – will better capture all the sources of competition among hospitals and better identify instances in which a small number of firms have the majority share.

HHI has, of course, its own limitations, as does any single measure in an empirical study. Notably, HHI is highly sensitive to the definition of the market upon which it is applied. Larger market definitions – i.e., more products/services or a larger geography – will almost always generate lower levels of HHI. In the hospital context, significant thought and often lengthy debate is involved in deciding the appropriate geography within which to perform the HHI calculation.[19] In this analysis, however, we rely on "off the shelf" geographic measures: ACA rating areas, as are used in the CBER brief, and other government-defined regions. Undoubtedly this choice affects our HHI calculations, and in any one matter (e.g., a particular firm accused of monopolization or a particular merger), more thought would be required to affirm or revise the relevant antitrust market definition for that case. There are many possible antitrust markets in Indiana depending on the circumstances, and we cannot analyze each and all of them. That said, for the purposes of this study, the exacting precision of our market definitions and resulting HHI calculation in any one specific place is less important for what we discuss below. Rather, our findings rely on establishing a consistent basis of comparison across measures and across areas, irrespective of how geographic areas are defined, and our ultimate conclusions are robust to changes to the geographic areas we use, as we demonstrate.

Finally, we note there are two methods to calculate HHI for any one market definition in hospital matters, as hospital services, in fact, involve two relevant locations: the patient's location (i.e., residence/origin) and the hospital's location (i.e., location of service).[20] While there is consensus on the general methodology for HHI (i.e., the sum of market shares squared), there is less consensus over which of the two location-specific measures is superior. We look at both.

The HHI based on hospital location ("hospital location HHI") looks only at the hospitals physically located in a particular area, measuring the size and significance of these physically proximate competitors. This method, however, ignores any and all patients that might travel outside of that particular area for care. There are countless examples in which this method misses important (and obvious) sources of competition. As is shown below, as one example, Rating Area 13 (just south of Rating Area 10 which encompasses the Indianapolis area) has relatively few hospitals physically within that area, but a large share of patients travel outside of the area to nearby Indianapolis for care. The hospital location HHI for Rating Area 13 misses a significant source of competition as a result. As a general rule and as the results below confirm, hospital location HHI will typically overstate the actual degree of concentration and understate the actual degree of competition. In rural areas, where patients often look to urban centers for hospital care, the degree by which hospital location HHI will overstate concentration can be quite significant.

The HHI based on patient location ("patient location HHI") overcomes the above issue by focusing on the patients that reside in a particular place and computing concentration based on patients' hospital choices, irrespective of each hospital's location. In doing so, this measure will more accurately capture all hospitals (i.e., competitors) that attract a significant share of patients, thus more holistically reflecting the degree of competition for patients. In the above example (Rating Area 13), this measure captures the

---

[19] *Ibid.*

[20] In fact, this two-location issue is quite general, as many goods and services are bought or consumed outside the consumer's home. Which of the two locations is more important will depend on many factors, including the individual characteristics of the industry in question.

competitive influence of Indianapolis hospitals based on the number of patients who leave Rating Area 13 for hospital care. Patient location HHI, however, has much more significant data needs, and patient-level data are often harder to obtain, sensitive in nature, and complex to analyze. As we show, patient location HHIs reflect an additional, potentially more accurate measure of concentration, but the data needs for this measure impede our ability to expand the analysis *en masse* across the United States as a whole. However, we are able to calculate this measure for Indiana hospitals, as we show.

4. Results

Our quantitative results are presented at the end of this report: Tables 1, 2A, 2B, 3A and 3B; and Figures 1 and 2. We find two notable results as they concern the CBER policy brief and Indiana hospital competition.

4.1. The CBER Policy Brief Provides a Misleading Picture of Indiana Hospital Concentration

As we explain above, the CBER measure of concentration is incomplete from a theoretical and practical standpoint. Still, as an empirical matter, we can nonetheless compare it to our measure of concentration. **Table 1** presents these calculations side-by-side, showing our replication of the CBER measure in Column (2) and our measure in Columns (3)-(7). A number of things stand out in these results.

First, there is a low correlation (between 0.1 and 0.5) between the CBER measure of concentration and HHI, helping to confirm what we expect based on theory. [21] The low correlation shows that the CBER measure struggles to consistently identify areas where fewer hospitals hold most of the patient volume and, at times, the measure can suggest the opposite. For example, Rating Area 10 (the Indianapolis area) has only 0.4 unaffiliated hospitals per capita, interpreted in the CBER brief's framework as a one of the most concentrated areas, but the HHI measures show that this area is one of the least concentrated across the state. Basic theory should predict that Indiana's most populated urban center – which objectively has many different hospitals – should be one of the less (or least) concentrated areas in the state. A conventional HHI measure produces a result consistent with this theory, but the CBER measure does not. Because the CBER measure ignores most hospitals, it is relatively ineffective and frequently misleading in measuring concentration as compared with the commonly accepted measure of HHI.

Second, we find HHI levels that show less concentration than the CBER policy brief suggests. Across a variety of datasets, we find hospital location HHI averages between 3,610 and 3,881, and Rating Area 10 (the Indianapolis area) has the majority of the statewide population and a hospital location HHI of roughly 2,000. [22] For reference, a generic market of five firms might reasonably produce HHIs around 2,000 to

---

[21] More concentrated markets have a higher HHI. For the CBER measure, more concentrated markets have a lower number of unaffiliated hospitals per capita. When calculating correlation between HHI and the CBER measure, we use the negative of the CBER measure to ensure that both measures are interpreted in the same direction.

[22] For context, other studies have found similar results. For example, the Healthcare Cost Institute found that the Indianapolis area is among 20% least concentrated metro areas (97 out of 112) across the United States based on HHI calculations. Healthcare Cost Institute. "Inpatient Hospital Market Concentration in U.S. Metros, 2016," https://www.healthcostinstitute.org/research/hmi/hmi-interactive#HMI-Concentration-Index (accessed October 21, 2019).

2,950,[23] three firms might reasonably produce HHIs around 3,333 to 4,150,[24] and two firms might reasonably produce HHIs around 5,000 to 5,800.[25] Thus, the results are consistent with the notion that the average rating area in Indiana has roughly three main competitors and the Indianapolis area has roughly five main competitors.

Third, we find patient location HHIs that are considerably lower still, as the theory discussed above predicts. The average across the state is between 2,810 and 2,881, and Rating Area 10 (Indianapolis) is still around 2,000. These results are consistent with the notion that the average rating area in Indiana has roughly five main competitors. Furthermore, the consistent difference between patient location HHIs and hospital location HHIs shows how the latter can often overestimate levels of concentration, particularly in rural areas.

4.2. Indiana Hospital Concentration is Consistent with the Rest of the United States

It is important to evaluate Indiana hospital concentration relative to a benchmark. For example, we might interpret Indiana's current hospital concentration differently if the nationwide norm was significantly above or below that of Indiana. Fortunately, the AHA data we use for our analysis allow just such a comparison. **Tables 2A and 2B** present the distribution of hospital concentration in Indiana compared with the rest of the United States. In making this comparison, two methodological clarifications are needed before turning to the results.

First, we turn away from ACA rating areas to other government defined areas: CSAs for the larger urban areas, CBSAs for the smaller urban areas and adjacent suburban areas outside of CSAs, and counties for the rural areas outside of both CSAs and CBSAs.[26] We note that CSAs and CBSAs have been used as relevant geographic markets in past antitrust matters related to hospitals, but as we acknowledge above, any one specific case in the future might or might not warrant a different geographic market.[27] In this application, however, since we are comparing the distribution in Indiana to the rest of the United States, the exact contours of any one area are less important so long as the areas we have selected are (i) a somewhat reasonable proxy for a plausible geographic market and (ii) they are defined fairly consistently across the United States as a whole. ACA rating regions are not consistently defined across the country (e.g., Indiana's are generally a grouping of counties, whereas Florida's are single counties), but CSAs, CBSAs, and rural counties are consistently defined across the country for the most part.

Second, we segment the areas by size in the table because economic theory (discussed shortly below) predicts that these different areas will have different levels of concentration. Common sense suggests we

---

[23] Market shares of five competitors (20% each) will generate an HHI of 2,000, and market shares of five competitors (45%, 25%, 10%, 10%, and 10%) will generate an HHI of 2,950.

[24] Market shares of three competitors (33.3% each) will generate an HHI of 3,333, and market shares of three competitors (45%, 45%, and 10%) will generate an HHI of 4,150.

[25] Market shares of two competitors (50% each) will generate an HHI of 5,000, and market shares of two competitors (70% and 30%) will generate an HHI of 5,800.

[26] This nested definition helps to also ensure that every area belongs to a single area definition.

[27] *Supra*, n. 10. See, e.g., *Charlotte-Mecklenburg Hospital Authority*, Complaint, p. 6 ("The relevant geographic market is no larger than the Charlotte area. In this Complaint, the Charlotte area means the Charlotte Combined Statistical Area, as defined by the U.S. Office of Management and Budget"); *Penn State Hershey*, Complaint, p. 10 ("The relevant geographic market in which to analyze the effects of the Merger is the Harrisburg Area, which is an area roughly equivalent to the Harrisburg Metropolitan Statistical Area [i.e., CBSA] (Dauphin, Cumberland, and Perry Counties) and Lebanon County.").

would not want to compare a small rural county in Indiana to a large urban area like Indianapolis, let alone compare that same rural county to an even larger urban area like New York or Los Angeles. There is also a mathematical component to this segmentation and logic. Large urban areas encompass more space and more hospital capacity is needed to support the larger population, so they will almost inevitably produce lower HHIs than rural counties that encompass relatively less space and less population. In this case, it would carry little theoretical or practical meaning in comparing a rural area of Indiana to Indianapolis. To some extent, this second consideration is inescapable in any comparison, but the maintained assumption here is that, within segments, the areas are comparable to one another to a first-order approximation (e.g., the Indianapolis CSA, though in some ways unique, can be reasonably compared with other CSAs like Kansas City and Las Vegas).

Turning to the results, we find that hospital concentration in Indiana compares similarly to the rest of the United States. For large CSAs (more than 1 million people), Indiana's single area (Indianapolis) compares similarly to other large urban areas around the country. For smaller CSAs, the majority of Indiana's areas (4 of 6) are in the second range (2,501-5,000) of HHIs, which is somewhat more frequent than the nationwide distribution. Among the smaller areas (CBSAs and rural counties), Indiana's areas are somewhat more frequently in the highest range (7,501-10,000) of HHIs, but the amount of difference compared with the national distribution is not so large as to cause a significantly different conclusion and some, if not most, of the difference is due to the small number of areas in Indiana.[28] Overall, the proportion within each range of HHIs is reasonably comparable between Indiana and the rest of the United States. Indiana has a slightly higher frequency of areas with HHI below 5,000 compared with the country as a whole. While Indiana's frequency within the top range of HHIs is slightly higher (3 percentage points), the difference is not so great as to skew the overall comparison.

We also present the results from the tables in graphical form in **Figure 1**, plotting HHI against population for each area.[29] Economic theory and empirical research has demonstrated that population size is a primary determinant of market structure, and this graph essentially recreates the same result and graph presented in a seminal article on the subject.[30] For Indiana areas with more than approximately 150 thousand people (= ln(11.9) in the logarithmic scale), the Indiana areas fall within the range of data for the United States overall (i.e., the red dots are not significantly above the blue dots). For areas with fewer than 150 thousand people (and as few as roughly 1 thousand people), most areas have only a small number of hospitals, causing HHIs for both Indiana and the rest of the country to vary from 5,000 to 10,000. Importantly, while Indiana has quite a few areas clustered at 10,000 HHI (i.e., only one hospital), the rest of the United States also exhibits this same pattern.

Finally, as we noted for Table 1, one should resist the urge to over-interpret the many areas in Indiana with 10,000 HHI as indication that there are many absolute monopolies. Rather, this result is an artifact of the hospital location HHI calculations. Each of these areas is a relatively remote (frequently very rural) community with only one hospital physically located within the area. As discussed above, this overstates

---

[28] The data show only 32 areas in Indiana and fewer in any single category. One should account for the small numbers in any comparison. For example, 7 of 9 (77.8%) of Indiana CBSAs are in the highest category (7,501-10,000), but a reduction in only a single market would result in 6 of 9 (66.6%), which is over 11 percentage points less and comparable to the nationwide proportion of 61.8%.

[29] Because area population is skewed (i.e., the largest urban areas far exceed the rural areas), we present the results in logarithmic scale. The conclusions are identical if the data are plotted without logarithms.

[30] Bresnahan, Timothy F., and Peter C. Reiss. "Entry in Monopoly Markets." *The Review of Economic Studies* 57.4 (1990): 531-553 and Bresnahan, Timothy F., and Peter C. Reiss. "Entry and Competition in Concentrated Markets." *Journal of Political Economy* 99.5 (1991): 977-1009, at Fig. 3 (showing a graph similar to our own in which the number of firms is increasing in market population).

the concentration, as many patients, in fact, travel to more urban areas to receive hospital care. To be clear, this overstatement does not invalidate the exercise. As we explain above, the key factor in comparing Indiana to the rest of the United States is comparability of data and methods. As we show, other rural areas around the country are similarly situated, such that Indiana and the rest of the United States have relatively similar frequencies of areas with 10,000 HHI.

Using the IHA data, we can recompute Tables 2A and 2B once again using the patient location HHIs. Since these data are limited to Indiana, we cannot compare these calculations to the rest of the country, but we can nonetheless show that Indiana's hospital concentration is, in truth, lower than Tables 2A and 2B indicate. This result follows from the above discussion. Were similar data available for the country as a whole, we would likely find a similar distribution of patient location HHIs for the rest of the country. These additional results are presented in **Tables 3A and 3B** and in **Figure 2**. As these show, the majority of Indiana's areas (26 of 32) have patient location HHIs below 5,000 (see Table 2A), and there are, in fact, no areas with an HHI of 10,000 (see Figure 2).

5.   Conclusion

Returning to address the CBER brief's conclusion of a "monopoly problem" with the above results in hand, we can offer a few more pointed observations about Indiana hospitals.

First, we find little to support the idea of a "monopoly problem" or that hospital "monopolies" are prevalent in Indiana. There are indeed hospitals, predominantly in rural communities, that are the only hospital physically within a proximate area. As a matter of arithmetic, these instances create hospital location HHIs of 10,000 (i.e., concentration equal to monopoly). But basic economic theory and more detailed data show that even these hospitals that appear to be "monopolies" often face one or more significant competitors, as the patient location HHIs that are generally below 5,000 and always below 10,000 demonstrate. Further, in our experience, many of these small rural hospitals struggle to remain viable and have no meaningful bargaining strength with insurers, offering yet other reasons why even high concentration (where it exists at all) does not necessarily imply anticompetitive conditions.

Thus, we find no indication in our hospital concentration calculations that suggests systematic monopolization by Indiana hospitals.[31] Indiana's levels of concentration compare similarly to the United States overall, and calculations using detailed data (i.e., patient location HHIs) show levels generally consistent with the presence of two or more significant competitors in the vast majority of areas.

Second, our results do illustrate that a small number of rural areas in Indiana do have higher concentration than more urban areas. Again, this is a result that is typical for the United States overall. More importantly, however, this result is both not surprising and not likely to be product of anticompetitive conduct, as the prior findings of the economic literature demonstrate. Economists generally expect small, rural markets to have fewer firms and higher levels of concentration than do large urban markets.[32] This is a simple application of economic incentives at work. Rural places, as a general rule, have low population,

---

[31] To be clear, this finding should not be confused with an *a priori* denial that monopolies exist. Among Indiana hospitals – as is always the case in any industry and any area – it is possible that there may be one or more monopolies (e.g., in the context of Sherman Act Section 2), dependent on many circumstances. Such a determination in any specific instance is well beyond the scope of this report and likely requires far more extensive analysis into that case. But the findings we present here do not suggest this hypothetical possibility is more likely in Indiana as compared with any other state, and we have no reason to expect state and federal antitrust laws are any less effective among Indiana hospitals as compared with any other setting.

[32] Supra, n. 30. These seminal papers discuss the relationship between market population and the number of firms. For example, Bresnahan and Reiss (1991) report market size required to support an additional business in various markets.

relatively low income, and less supply of medical professionals and other key hospital inputs. These conditions make it difficult for hospitals (both nonprofit and for-profit) to operate and remain financially viable over the long-run. This is something that is well recognized in the medical and economic literature[33] and in healthcare policy,[34] and simple common-sense examples illustrate this intuition. Should we expect a rural community of 15,000 people to have 4 or 5 separate hospitals located directly within that small community? Surely that is an inefficient allocation of resources, and yet 4 or 5 hospitals would likely be required to produce a hospital location HHI of 3,000 or less. We believe few economists would recommend a single HHI threshold to be applied to all markets irrespective of their attributes, and based on the findings in the economic literature, it is fully expected that markets will vary in concentration depending on various factors, such as size and availability of resources. Thus, we should not jump to the conclusion that Indiana has a "monopoly problem" simply due to the mere existence of a few of more concentrated rural areas in the state.

Finally, the CBER brief's recommendations for additional taxation and new regulation seem to us far in excess of what the hospital concentration results show. One of the brief's recommendations is to tax non-profit hospitals at the rate of for-profit institutions, based on the above-mentioned concentration results and seemingly implausible results concerning hospital profits.[35] Additionally, the brief recommends horizontal and vertical disintegration be more actively pursued in Indiana. Disintegration of established hospital systems and additional taxation seem likely to hinder rather than enhance competition in Indiana. For example, severing smaller hospitals from their larger systems could hinder their access to lower cost inputs (e.g., more favorable purchasing prices for medical devices and drugs) and important shared services (e.g., common IT platforms).[36] Likewise, further taxing smaller rural hospitals with low or negligible operating margins might jeopardize the financial sustainability of these hospitals and spur exit, which would increase rather than decrease concentration.

In sum, we find no results in our analysis of Indiana hospital concentration to suggest that Indiana faces a "monopoly problem." Indiana appears comparable to the rest of the United States, and where Indiana hospitals are more concentrated, our findings suggest that these few instances should not raise new concerns related to competition. As a result, we question the necessity of the policy recommendations presented in the CBER brief.

---

[33] Joynt, Karen E., et al. "Quality of Care and Patient Outcomes in Critical Access Rural Hospitals." *JAMA* 306.1 (2011): 45-52. Younis, Mustafa Z. "A Comparison Study of Urban and Small Rural Hospitals Financial and Economic Performance." *Journal of Rural Nursing and Health Care* 3.1 (2012): 38-48.

[34] Center for Medicare & Medicaid Services. "Critical Access Hospital Fact Sheet." July 2019, https://www.cms.gov/Outreach-and-Education/Medicare-Learning-Network-MLN/MLNProducts/Downloads/CritAccessHospfctsht.pdf (accessed October 16, 2019).

[35] *Supra*, n. 2.

[36] Noether, Monica, et al. "Hospital Merger Benefits: Views from Hospital Leaders and Econometric Analysis - An Update." American Hospital Association, September 2019, https://www.aha.org/system/files/media/file/2019/09/cra-report-merger-benefits-2019-f.pdf (accessed October 16, 2019).

Table 1

<div align="center">

Comparison of Concentration Measures
Indiana Hospitals
2015 - 2018

</div>

ACA Rating Area	Measure Used in CBER Brief[1] AHA Data[2]	Herfindahl-Hirschman Indices (HHIs)				
		AHA Data[3]	2015 IHA Data[4]		2018 IHA Data[4]	
	Hospital Location[5]	Hospital Location[5]	Hospital Location[5]	Patient Location[6]	Hospital Location[5]	Patient Location[6]
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Rating Area 1	0.26	2,764	2,336	2,186	2,905	2,686
Rating Area 2	0.49	3,775	3,458	2,766	3,365	2,655
Rating Area 3	0.92	3,015	3,177	2,737	3,575	2,843
Rating Area 4	0.00	5,103	8,423	6,985	8,047	6,714
Rating Area 5	0.00	3,370	4,177	3,095	3,637	3,008
Rating Area 6	1.55	2,715	2,282	1,908	2,661	2,162
Rating Area 7	0.30	4,670	5,933	2,821	6,132	2,510
Rating Area 8	0.40	6,180	4,945	3,321	4,776	2,817
Rating Area 9	1.07	5,096	5,253	3,246	5,351	3,221
Rating Area 10	0.40	1,999	2,163	2,186	2,029	1,995
Rating Area 11	1.12	2,399	2,112	1,951	2,413	2,189
Rating Area 12	2.09	4,599	4,583	1,987	4,410	1,876
Rating Area 13	0.28	6,939	8,814	3,004	7,127	2,774
Rating Area 14	1.70	5,847	5,195	3,248	5,034	2,506
Rating Area 15	0.88	2,843	2,750	1,674	2,480	1,580
Rating Area 16	0.93	3,345	4,143	3,920	4,014	3,696
Rating Area 17	0.00	5,561	5,376	4,906	5,163	4,794
Population Weighted Average:[7]	0.57	3,610	3,881	2,881	3,809	2,811
Correlation with Measure Used in CBER Brief:	-	0.11	0.31	0.47	0.28	0.50

[1] Measure counts the number of unaffiliated hospitals in each ACA Rating Area per 100,000 residents. This definition is taken from Dr. Michael J. Hicks, Center for Business and Economic Research (CBER), Ball State University, *Indiana has a Monopoly Problem in Healthcare; Preliminary evidence and recommendations,* September 2019.

[2] Hospital affiliations are determined using data from the American Hospital Association (AHA). Analysis is restricted to general acute care hospitals only.

[3] HHIs are calculated using annual hospital admissions, as reported by the AHA. Analysis is restricted to general acute care hospitals only.

[4] HHIs are calculated using discharge data from the Indiana Hospital Association (IHA). Analysis is restricted to commercial acute care inpatient discharges from general acute care hospitals. "Commercial" includes discharges with "Commercial Insurance" as the primary payor. "Acute care inpatient discharges" exclude normal newborn, mental health, substance abuse, and rehabilitation MS-DRGs.

Table 1

<div align="center">

Comparison of Concentration Measures
Indiana Hospitals
2015 - 2018

</div>

[5] "Hospital Location" indicates that the concentration measure was calculated using only hospitals in the designated area but counting all admissions or discharges irrespective of patients' residences.

[6] "Patient Location" indicates that the concentration measure was calculated using only discharges for patients residing in the designated area but counting all Indiana hospitals treating those patients irrespective of the hospitals' locations.

[7] Weighted by the population in each ACA Rating Area.

Sources: American Hospital Association, DataViewer, accessed September 3, 2019.

"Indiana Geographic Rating Areas," Centers for Medicare & Medicaid Services, https://cms.gov/CCIIO/ Programs-and-Initiatives/Health-Insurance-Market-Reforms/in-gra.html, accessed October 8, 2019.

Indiana Inpatient Discharge Data, IHA, 2015 and 2018.

Internet Searches.

Indiana Hospital Concentration Compared to the United States Overall
Based on Hospital Location[1]
2018

Area	Number of Areas with an HHI in the Range:			
	0 - 2,500	2,501 - 5,000	5,001 - 7,500	7,501 - 10,000
(1)	(2)	(3)	(4)	(5)
CSAs (Greater than 1,000,000 people)				
Indiana	1	-	-	-
Nationwide (Excluding Indiana)	34	20	-	-
CSAs (Fewer than 1,000,000 people)				
Indiana	-	4	-	2
Nationwide (Excluding Indiana)	7	61	35	8
CBSAs (Outside of CSAs)				
Indiana	-	1	1	7
Nationwide (Excluding Indiana)	3	53	86	230
Rural Counties (Outside of CSAs and CBSAs)				
Indiana	-	-	1	15
Nationwide (Excluding Indiana)	-	8	97	804
Total				
Indiana	1	5	2	24
Nationwide (Excluding Indiana)	44	142	218	1,042

[1] HHIs are calculated using annual hospital admissions, as reported by the American Hospital Association (AHA), only from general acute care hospitals in the designated area but counting all admissions irrespective of patients' residences.

Notes: "-" indicates there are no areas with an HHI in the specified range.

"CSAs" refer to Combined Statistical Areas.

"CBSAs" refer to Core-Based Statistical Areas that are not part of a CSA.

"Rural Counties" refer to counties that are not part of a CSA or CBSA.

"Nationwide" includes all areas outside of Indiana.

CSAs and CBSAs are counted as part of Indiana if the majority of the population lives inside the state.

Sources: American Hospital Association, DataViewer, accessed September 3, 2019.

"Geography Reference Maps," U.S. Census Bureau, https://census.gov/programs-surveys/geography/geographies/reference-maps.2018.html, September 2018.

Internet Searches.

Indiana Hospital Concentration Compared to the United States Overall
Based on Hospital Location[1]
2018

Area	Percentage of Areas with an HHI in the Range:			
	0 - 2,500	2,501 - 5,000	5,001 - 7,500	7,501 - 10,000
(1)	(2)	(3)	(4)	(5)
CSAs (Greater than 1,000,000 people)				
Indiana	100.0 %	- %	- %	- %
Nationwide (Excluding Indiana)	63.0	37.0	-	-
CSAs (Fewer than 1,000,000 people)				
Indiana	- %	66.7 %	- %	33.3 %
Nationwide (Excluding Indiana)	6.3	55.0	31.5	7.2
CBSAs (Outside of CSAs)				
Indiana	- %	11.1 %	11.1 %	77.8 %
Nationwide (Excluding Indiana)	0.8	14.2	23.1	61.8
Rural Counties (Outside of CSAs and CBSAs)				
Indiana	- %	- %	6.3 %	93.8 %
Nationwide (Excluding Indiana)	-	0.9	10.7	88.4
Total				
Indiana	3.1 %	15.6 %	6.3 %	75.0 %
Nationwide (Excluding Indiana)	3.0	9.8	15.1	72.1

[1] HHIs are calculated using annual hospital admissions, as reported by the American Hospital Association (AHA), only from general acute care hospitals in the designated area but counting all admissions irrespective of patients' residences.

Notes: "-" indicates there are no areas with an HHI in the specified range.

"CSAs" refer to Combined Statistical Areas.

"CBSAs" refer to Core-Based Statistical Areas that are not part of a CSA.

"Rural Counties" refer to counties that are not part of a CSA or CBSA.

"Nationwide" includes all areas outside of Indiana.

CSAs and CBSAs are counted as part of Indiana if the majority of the population lives inside the state.

Sources: American Hospital Association, DataViewer, accessed September 3, 2019.

"Geography Reference Maps," U.S. Census Bureau, https://census.gov/programs-surveys/ geography/geographies/reference-maps.2018.html, September 2018.

Internet Searches.

Table 3A

<h1 style="text-align:center">Indiana Hospital Concentration
Based on Patient Location[1]
2018</h1>

Area[2]	Number of Areas with an HHI in the Range:			
	0 - 2,500	2,501 - 5,000	5,001 - 7,500	7,501 - 10,000
(1)	(2)	(3)	(4)	(5)
CSAs (Greater than 1,000,000 people)	1	-	-	-
CSAs (Fewer than 1,000,000 people)	-	4	2	-
CBSAs (Outside of CSAs)	-	7	2	-
Rural Counties (Outside of CSAs and CBSAs)	5	9	1	1
Total	**6**	**20**	**5**	**1**

[1] HHIs are calculated using only discharges for patients residing in the designated area but counting all Indiana general acute care hospitals treating those patients irrespective of the hospitals' locations. Analysis is restricted to commercial acute care inpatient discharges. "Commercial" includes discharges with "Commercial Insurance" as the primary payor. "Acute care inpatient discharges" exclude normal newborn, mental health, substance abuse, and rehabilitation MS-DRGs.

[2] Analysis is restricted to patients from an area with at least one general acute care hospital.

Notes: "-" indicates there are no areas with an HHI in the specified range.

"CSAs" refer to Combined Statistical Areas.

"CBSAs" refer to Core-Based Statistical Areas that are not part of a CSA.

"Rural Counties" refer to counties that are not part of a CSA or CBSA.

CSAs and CBSAs are counted as part of Indiana if the majority of the population lives inside the state.

Sources: American Hospital Association, DataViewer, accessed September 3, 2019.

"Geography Reference Maps," U.S. Census Bureau, https://census.gov/programs-surveys/geography/geographies/reference-maps.2018.html, September 2018.

Indiana Inpatient Discharge Data, IHA, 2018.

Internet Searches.

Table 3B

Indiana Hospital Concentration
Based on Patient Location[1]
2018

	Percentage of Areas with an HHI in the Range:			
Area[2]	0 - 2,500	2,501 - 5,000	5,001 - 7,500	7,501 - 10,000
(1)	(2)	(3)	(4)	(5)
CSAs (Greater than 1,000,000 people)	100.0 %	- %	- %	- %
CSAs (Fewer than 1,000,000 people)	-	66.7	33.3	-
CBSAs (Outside of CSAs)	-	77.8	22.2	-
Rural Counties (Outside of CSAs and CBSAs)	31.3	56.3	6.3	6.3
Total	**18.8 %**	**62.5 %**	**15.6 %**	**3.1 %**

[1] HHIs are calculated using only discharges for patients residing in the designated area but counting all Indiana general acute care hospitals treating those patients irrespective of the hospitals' locations. Analysis is restricted to commercial acute care inpatient discharges. "Commercial" includes discharges with "Commercial Insurance" as the primary payor. "Acute care inpatient discharges" exclude normal newborn, mental health, substance abuse, and rehabilitation MS-DRGs.

[2] Analysis is restricted to patients from an area with at least one general acute care hospital.

Notes: "-" indicates there are no areas with an HHI in the specified range.

"CSAs" refer to Combined Statistical Areas.

"CBSAs" refer to Core-Based Statistical Areas that are not part of a CSA.

"Rural Counties" refer to counties that are not part of a CSA or CBSA.

CSAs and CBSAs are counted as part of Indiana if the majority of the population lives inside the state.

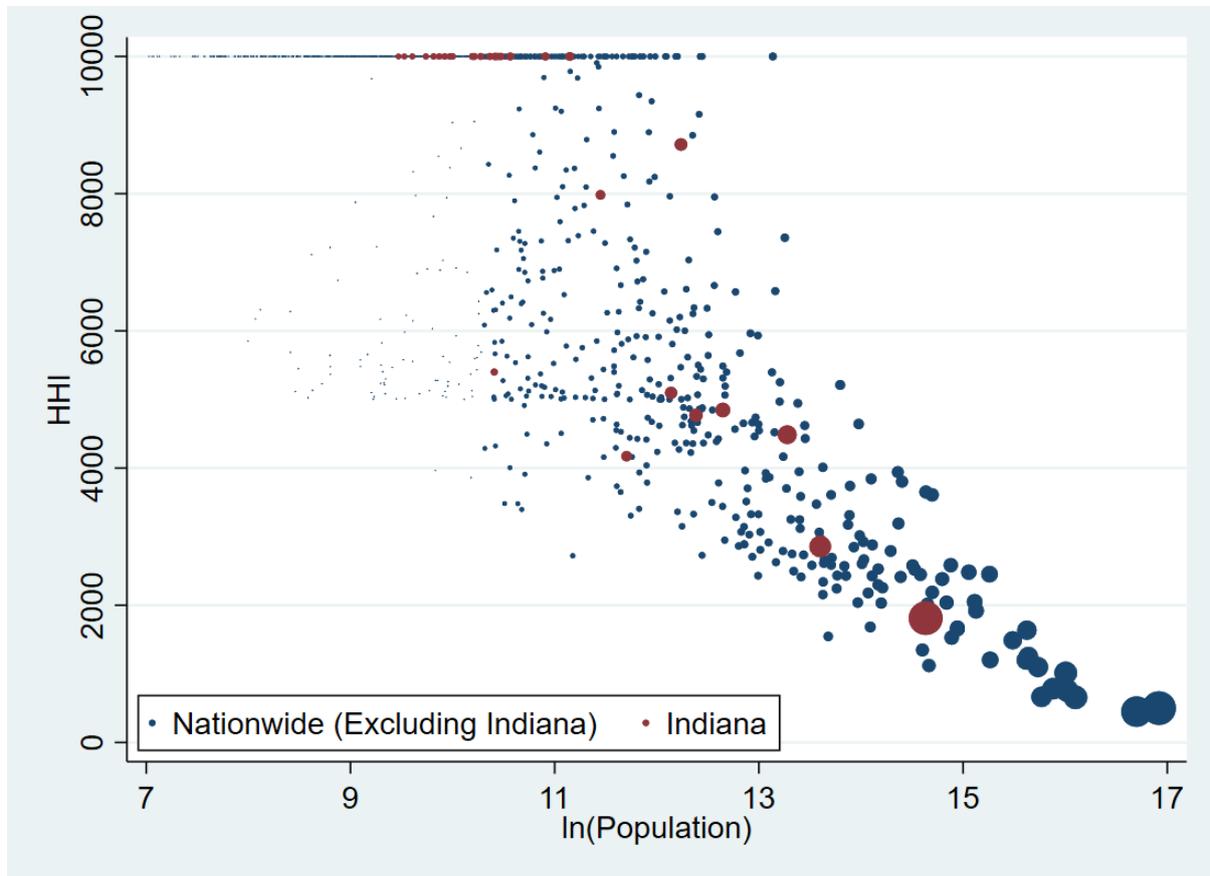Sources: American Hospital Association, DataViewer, accessed September 3, 2019.

"Geography Reference Maps," U.S. Census Bureau, https://census.gov/programs-surveys/ geography/geographies/reference-maps.2018.html, September 2018.

Indiana Inpatient Discharge Data, IHA, 2018.

Internet Searches.

Figure 1

Hospital Concentration Compared with Population
Indiana and the United States
Based on Hospital Location[1]
2018

[1] HHIs are calculated using annual hospital admissions, as reported by the American Hospital Association (AHA), only from general acute care hospitals in the designated area but counting all admissions irrespective of patients' residences.
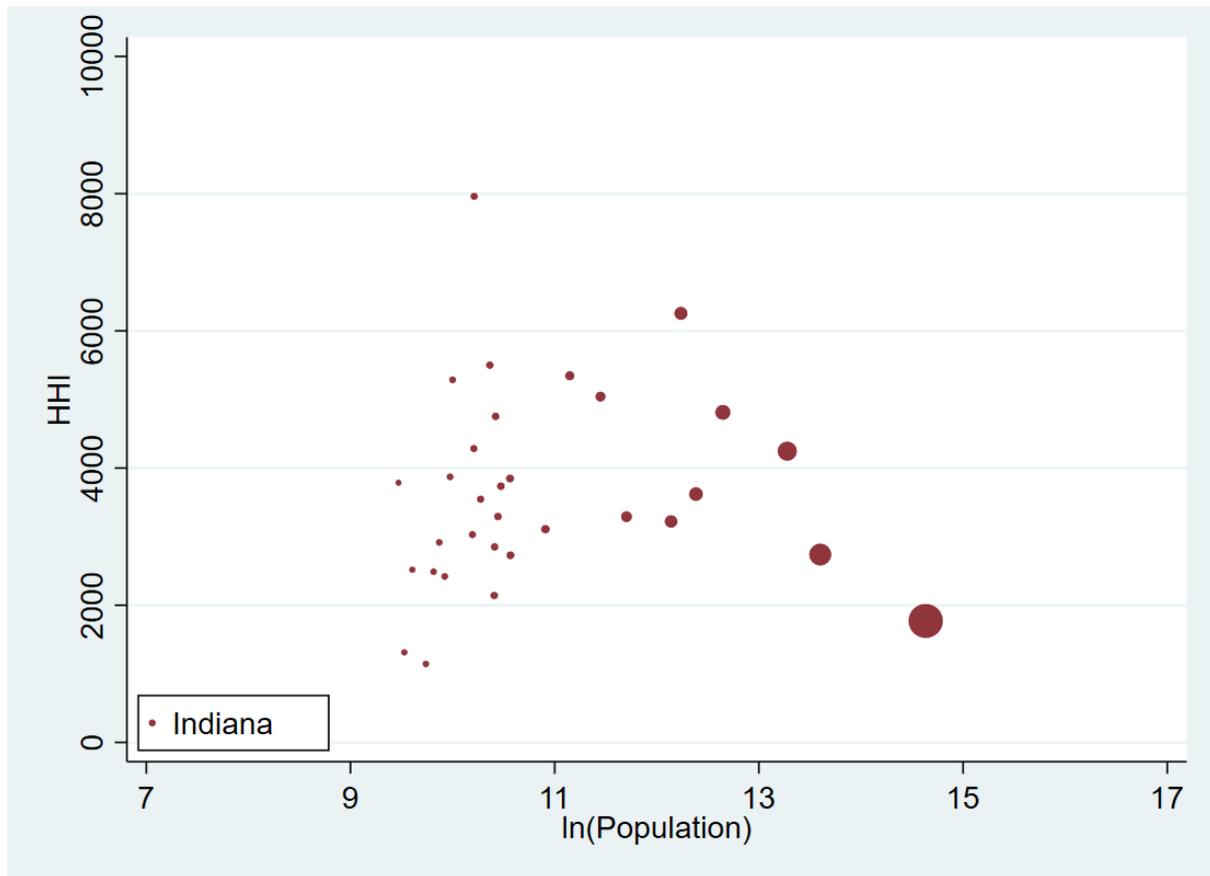
Notes: "Nationwide" includes all areas outside of Indiana.

Larger dots indicate areas with larger population.

Source: American Hospital Association, DataViewer, accessed September 3, 2019.

Figure 2

Hospital Concentration Compared with Population
Indiana
Based on Patient Location[1]
2018

[1] HHIs are calculated using only discharges for patients residing in the designated area but counting all Indiana general acute care hospitals treating those patients irrespective of the hospitals' locations. Analysis is restricted to commercial acute care inpatient discharges. "Commercial" includes discharges with "Commercial Insurance" as the primary payor. "Acute care inpatient discharges" exclude normal newborn, mental health, substance abuse, and rehabilitation MS-DRGs.

Note: Larger dots indicate areas with larger population.

Sources: American Hospital Association, DataViewer, accessed September 3, 2019.

Indiana Inpatient Discharge Data, IHA, 2018.