

# Hospital Ownership of Physicians: Hospital Versus Physician Perspectives

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## Abstract

Although there has been significant interest from health services researchers and policy makers about recent trends in hospitals' ownership of physician practices, few studies have investigated the strengths and weaknesses of available data sources. In this article, we compare results from two national surveys that have been used to assess ownership patterns, one of hospitals (the American Hospital Association survey) and one of physicians (the SK&A survey). We find some areas of agreement, but also some disagreement, between the two surveys. We conclude that full understanding of the causes and consequences of hospital ownership of physicians requires data collected at the both the hospital and the physician level. The appropriate measure of integration depends on the research question being investigated.

## Keywords

integration, hospital ownership of physicians, organizations

## Introduction

Several studies have documented a rapid increase in hospitals' ownership of physician practices over the past decade. According to Kocher and Sahni (2011), the share of physician practices owned by hospitals more than doubled from 2002 to 2008, from

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just over 20% to over 50%. Interviews of market participants by the Center for Studying Health System Change also find that hospital employment of physicians grew rapidly from 2007 to 2010 (O'Malley, Bond, & Berenson, 2011; O'Malley, Grace, et al., 2011). However, because these and other studies of ownership of physicians have been based on samples of selected types of providers from selected geographic areas, their findings may not generalize beyond the settings in which they were obtained (Kane & Emmons, 2013).

Yet understanding how practice ownership is changing across the entire population of providers is important for health policy. On one hand, closer ties between hospitals and physicians can improve communication across care settings and reduce wasteful duplication of effort. On the other hand, increased ownership of physician practices by hospitals may hurt consumers by allowing hospitals and physicians to raise prices (Baker, Bundorf, & Kessler, 2014). Questions about practice ownership are especially topical because the Affordable Care Act creates incentives that are likely to intensify the ties between hospitals and physicians, through its support of Accountable Care Organizations.

Despite this, little work has compared how different data sources assess the extent of hospital ownership of physician practices. In this article, we catalogue the major surveys and analyze data from the two largest national surveys that have been used to assess ownership patterns. The two surveys that we examine in detail investigate the ownership question from two different perspectives. One (the American Hospital Association [AHA] survey) polls hospitals; the other (the SK&A survey) polls physicians. We match the two surveys with data from the Medicare program to calculate statistics that are representative of the population of U.S. hospital admissions. We find some areas of agreement, but also some disagreement, between the two surveys. We conclude that full understanding of the causes and consequences of hospital ownership of physician practices requires data collected at the both the hospital and the physician level. The appropriate measure of integration depends on the research question being investigated.

## **Data**

Table 1 highlights the strengths and weaknesses of the five major U.S. surveys of hospital ownership of physician practices. The first two surveys in Table 1 are based on highly selected samples, but collect much more detailed information than the other three. The Medical Group Management Association (MGMA) Physician Compensation and Production survey covers only a small, nonrepresentative subset of all U.S. physicians. The Integrated Healthcare Association/Cattaneo & Stroud survey also covers a small, nonrepresentative subset of physicians and is geographically limited to California. The third survey, the American Medical Association Physician Practice Benchmark Survey, is based on a nationally representative weighted random sample of U.S. physicians, but cannot be used to identify either ownership trends (because it only exists for 1 year) or ownership levels at a subnational or lower level (because of its relatively small sample size).

**Table 1.** Surveys of Hospital Ownership of Physician Practices.

Survey	Frequency	Sample
Medical Group Management Association (MGMA) Physician Compensation and Production	Annual	Physicians from large groups, representing approximately 8.5% of U.S. physicians (2013) <sup>a</sup>
Integrated Healthcare Association/Cattaneo & Stroud	Annual	Physicians from groups with >5 primary care physicians and a commercial HMO contract, representing 24% of California physicians serving individuals with employer health insurance (2012) <sup>b</sup>
American Medical Association Physician Practice Benchmark Survey	2012	Nationally representative 1/200 weighted random sample of U.S. physicians <sup>c</sup>
American Hospital Association SK&A	Annual	All U.S. hospitals <sup>d</sup>
	Annual	Approximately 75% of U.S. office-based physicians (2012) <sup>e</sup>

Note. HMO = Health Maintenance Organization.

<sup>a</sup>According to Kane and Emmons (2013), MGMA survey respondents are disproportionately from large groups. According to <http://www.aafp.org/news/practice-professional-issues/20140714mgmasalary.html>, the MGMA survey covers "at least" 60,100 physicians. This represents approximately 8.5% of all 708,170 U.S. physicians who provide patient care, including hospital-based physicians, excluding residents and interns. See Association of American Medical Colleges (2013). <sup>b</sup>Robinson and Miller (2014), weighted by number of HMO enrollees. <sup>c</sup>Kane and Emmons (2013). <sup>d</sup><http://www.ahadataviewer.com/about/data>. <sup>e</sup>Baker, Bundorf, and Kessler (2016).

The only two surveys that have been repeated over time and can be generalized to the United States as a whole are the AHA survey of hospitals and the SK&A survey of physicians.<sup>1</sup> The AHA surveys all U.S. hospitals, and is used as a census of facilities by several U.S. government agencies.<sup>2</sup> The survey asks each sample hospital about the types of its ownership relationships with physicians, including the number of physicians covered by each type of relationship. Following Cuellar and Gertler (2006) and Ciliberto and Dranove (2006), we classify a hospital as owning a physician practice if the survey indicates that the hospital is a "fully integrated organization," which includes hospitals owning physician practices through integrated salary models, equity models, and foundations. If a hospital reported any of these types of affiliation, we counted it as "owning" in that year, whether it reported any other types of affiliation, and we include the number of physicians these arrangements in the count of the number of physicians in the hospital-owned practice.

The SK&A survey polls U.S. office-based providers, including physicians and non-physician professionals. The survey asks each sample physician about the identity of the hospital or hospitals, if any, that have an ownership interest in the physician's practice. Individual hospitals are tracked with a unique identifier. Although the sampling frame of the SK&A survey is physicians, its reported ownership relationships allow us to impute which hospitals own physician practices. We define a hospital as

owning if any physician reported it as such; however, because SK&A surveys only a sample of physicians (albeit an approximately 75% sample in 2012), and includes only office-based physicians (i.e., excludes hospital-based physicians), the fact that a hospital is not reported by any SK&A physician as an owner of a physician practice does not necessarily mean that it is not an owner of any physician practices.

We focus our analysis on the AHA and SK&A surveys. We examine AHA survey data from nonfederal, short-term, general medical and surgical hospitals. We match data for 2008 and 2012 from the AHA and SK&A surveys to the Medicare 100% inpatient and enrollment files. We use data from the 100% Medicare inpatient and enrollment files to calculate the number of admissions to each sample hospital, and the number of admissions by each sample physician (as reported on the admitting physician field of the inpatient claim), which we use to calculate admission-weighted ownership rates. We include only inpatient admissions from the Traditional Medicare population (i.e., excluding Medicare Advantage enrollees) and those from nonfederal, short-term, general medical and surgical hospitals for which there is a valid National Provider Identifier for the admitting physician.

## Results

We begin our analysis from the perspective of the physician. The first row of Table 2 shows how many physicians in the AHA and SK&A surveys, in the United States as a whole, were part of practices owned by a hospital in 2008 and 2012. Because the AHA surveys hospitals, it does not identify the ownership status of individual physicians; the survey asks respondent hospitals to report the number of physicians with which the hospital has an ownership relationship. As such, the AHA survey double-counts physicians who are owned by multiple hospitals. Because the SK&A surveys physicians, it identifies the ownership status of individual physicians and so enables us to avoid double-counting. Despite this, we report the total number of ownership relationships reported by physicians to SK&A, allowing for double-counting, to make the two measures comparable.<sup>3</sup>

The second row of Table 2 reports the total number of physicians covered by each survey. The AHA survey does not explicitly specify the universe of physicians that it covers. We assume the universe of physicians covered by AHA includes all U.S. physicians who provide patient care, including hospital-based physicians, excluding residents and interns. The last three rows of Table 2 report the share of physicians owned by hospitals, both unweighted and weighted by the number of Medicare admissions that list the physician's National Provider Identifier on the "admitting physician" field.

The top panel of Table 2 shows that the two sources agree that the number of physicians in practices owned by hospitals has increased rapidly in recent years. Unweighted, the AHA reports that the share of physicians in practices owned by hospitals increased by 13.6 percentage points; SK&A reports an analogous increase of 9.7 percentage points (the very large increase in the *number* of physicians in a hospital-owned practice in SK&A is due, in part, to the expansion of the survey's sample<sup>4</sup>). In both surveys, this amounts to almost a doubling in proportional terms.<sup>5</sup> The increase in the

**Table 2.** Number of Physicians in Hospital-Owned Practices (AHA and SK&A, 2008 and 2012).

	AHA			SK&A		
	2008	2012	Change	2008	2012	Change
<b>All United States</b>						
Number of physicians in practices owned by hospitals <sup>a</sup>	110,284	213,130	93.3%	31,710	105,538	232.8%
Total number of physicians	667,827 <sup>b</sup>	708,170 <sup>b</sup>	6.0%	277,090	501,482	81.0%
Percentage of physicians in practices owned by hospitals						
Unweighted	16.5	30.1	13.6 <sup>c</sup>	11.4	21.1	9.7 <sup>c</sup>
Weighted by Medicare admissions	[ <sup>d</sup> ]	[ <sup>d</sup> ]	[ <sup>d</sup> ]	10.6	23.4	12.8 <sup>c</sup>
<b>California only</b>						
Number of physicians in practices owned by hospitals <sup>a</sup>	13,293	19,798	48.9%	2,887	9,673	235.1%
Total number of physicians	80,076 <sup>b</sup>	85,542 <sup>b</sup>	6.8%	29,902	55,943	87.1%
Percentage of physicians in practices owned by hospitals						
Unweighted	16.6	23.1	6.5 <sup>c</sup>	9.7	17.3	7.6 <sup>c</sup>
Weighted by Medicare admissions	[ <sup>d</sup> ]	[ <sup>d</sup> ]	[ <sup>d</sup> ]	9.3	15.6	6.3 <sup>c</sup>

<sup>a</sup>The American Hospital Association (AHA) survey, which is of hospitals, does not identify the ownership status of individual physicians. As such it double-counts physicians who are owned by multiple hospitals. Although the SK&A survey does identify the ownership status of individual physicians, we report the total number of ownership relationships by physicians in SK&A, allowing for double-counting, to make it comparable. <sup>b</sup>The AHA survey, which is of hospitals, does not explicitly specify the universe of physicians that it covers. We assume the universe of physicians covered by AHA includes all U.S. physicians who provide patient care, including hospital-based physicians, excluding residents and interns. See Association of American Medical Colleges (2009, 2013). <sup>c</sup>Changes reported in percentage points. <sup>d</sup>Because the AHA survey does not identify the ownership status of individual physicians, we cannot weight physicians' ownership status, as measured by AHA, by the number of patients the physicians admit.

admission-weighted share of physicians in hospital-owned practices in SK&A is even larger than the unweighted share (although the starting level is lower), indicating that practices that hospitals acquired from 2008 to 2012 contained physicians who were more likely to admit patients than average.<sup>6</sup>

Although the two sources report similar *trends* in ownership of physicians, they report different *levels* of ownership, with the AHA approximately 4 percentage points higher than SK&A. This is likely due to the fact that SK&A samples only office-based physicians. According to the National Center for Health Statistics (2011, 2014), full-time hospital staff of all specialties account for a significant share of all physicians involved in patient care. In 2008, there were 75,976 full-time hospital staff physicians out of a total population of 632,794 (or 12%); by 2012, that number had risen to 82,240 out of a total of 668,173 (or 12.3%). Because the AHA survey does not separately report the number of full-time hospital staff and office-based physicians that survey hospitals own, we cannot determine how much of the difference in levels of

**Table 3.** Number of Hospitals Owning Physician Practices (AHA and SK&A, 2008 and 2012).

	AHA			SK&A		
	2008	2012	Change	2008	2012	Change
<b>All United States</b>						
Number of hospitals owning physician practices	1,375	1,580	14.9%	1,886	2,677	41.9%
Total number of hospitals	4,536	4,551	0.3%	[ <sup>a</sup> ]	[ <sup>a</sup> ]	[ <sup>a</sup> ]
Percentage of hospitals owning physician practices						
Unweighted	30.3	34.7	4.4 <sup>b</sup>	41.6	58.8	17.2 <sup>b</sup>
Weighted by Medicare admissions	38.5	44.0	5.5 <sup>b</sup>	67.2	88.2	21.0 <sup>b</sup>
<b>California only</b>						
Number of hospitals owning physician practices	37	49	32.4%	152	227	49.3%
Total number of hospitals	328	325	-0.9%	[ <sup>a</sup> ]	[ <sup>a</sup> ]	[ <sup>a</sup> ]
Percentage of hospitals owning physician practices						
Unweighted	11.3	15.1	3.8 <sup>b</sup>	46.3	69.8	23.5 <sup>b</sup>
Weighted by Medicare admissions	17.0	24.7	7.7 <sup>b</sup>	63.1	85.5	22.4 <sup>b</sup>

Note. AHA = American Hospital Association.

<sup>a</sup>The SK&A survey, which is of physicians, does not explicitly specify the universe of hospitals that it covers. We assume the universe of hospitals covered by SK&A is the same as the universe covered by our AHA sample of all U.S. nonfederal, short-term, general medical/surgical facilities. <sup>b</sup>Changes reported in percentage points.

ownership between the two sources is due to the exclusion of hospital-based physicians by SK&A. However, to the extent that full-time hospital staff physicians are more likely to be part of a hospital-owned practice, the difference in the two surveys' sampling frames could explain the difference in the levels of hospital ownership.

The bottom panel of Table 2 replicates the top panel for California only, to investigate the extent of geographic heterogeneity in trends in ownership. Both surveys indicate that ownership is lower and increasing less rapidly in California than the United States as a whole. In addition, the results from the two surveys are closer in California than in the United States as a whole. These empirical regularities are consistent with California's legal restrictions on hospital employment of physicians (California Health Care Foundation, 2009). Restrictions on hospital employment would reduce the number of physicians on hospital staffs, thereby lowering the levels and potential growth rates of hospital ownership, as well as reducing the importance of the difference in sampling frames that is likely to explain the difference in ownership rates.

Table 3 examines ownership from the hospital's perspective, comparing 2008 to 2012 trends in hospital ownership rates from the AHA to that imputed from SK&A.

**Table 4.** Sensitivity and Specificity of SK&A Measure of Hospital Ownership of Physician Practices, 2008 and 2012.

	2008	2012
Unweighted		
Sensitivity	0.505	0.642
Specificity	0.623	0.440
Weighted by Medicare admissions		
Sensitivity	0.763	0.911
Specificity	0.384	0.141

The first row of Table 3 shows how many hospitals in each survey report owning one or more physician practices. The second row of Table 3 contains the total number of hospitals in our AHA sample; there is no corresponding number for SK&A because the target population of SK&A is physicians. The third and fourth rows of Table 3 report the share of hospitals owning physician practices, both unweighted and weighted by the hospital's number of Medicare admissions. We assume the universe of hospitals covered by SK&A is the same as the universe covered by our AHA sample.

Table 3 shows that hospital ownership of physician practices increased from 2008 to 2012. According to AHA, the share of owning hospitals rose from 30.3% to 34.7%. Weighted by Medicare admissions, the level of ownership is higher, reflecting that fact that larger hospitals are more likely to own physician practices, although the trend in ownership is similar. According to SK&A, the share of owning hospitals rose from 41.6% to 58.8%; weighted by Medicare admissions, the share of owning hospitals is higher, just as in the AHA.

Both sources agree that it is more common for a hospital to own physician practices than for a physician's practice to be owned by a hospital. Both sources also agree that integration is increasing, and that the share of physicians in practices owned by a hospital is increasing faster than the share of hospitals owning physician practices. Additional analysis (not in any table) shows that this is because most of the additional integration in recent years has been in hospitals that already owned physician practices. In the 2008 SK&A survey, 31,710 physicians reported being part of a hospital-owned practice; by 2012, this number increased to 105,538. Of this 105,538, only 17,877 (or 16.9% of) physicians reported being owned by a hospital that did not own any physician practices in 2008.<sup>7</sup>

The sources differ, however, in their estimate of the level of hospital ownership of physician practices. Table 4 investigates the reasons for the difference between the two surveys. It presents, for 2008 and 2012, the sensitivity and specificity of the imputed SK&A measure of hospital ownership with respect to the AHA measure. It shows that the imputed SK&A measure fails to detect some "true" owners (according to AHA), which is not surprising: As discussed above, SK&A excludes hospital-based physicians (who may be in practices owned by hospitals at a relatively higher rate) and is based on only a sample of physicians rather than the entire U.S. physician population.

Of potentially greater concern is SK&A's labeling of many AHA-nonowning hospitals as owners. Using the AHA as the "gold standard" the SK&A measure has relatively low and declining specificity: weighted by admissions, by 2012 fully 85.9% ( $1 - 0.141$ ) of nonowners according to AHA were labeled as owners by SK&A.

We offer three hypotheses to explain this phenomenon. First, it could be due to measurement error in the imputation of hospital-level ownership data from the (physician-level) SK&A. Because the population of physicians is much larger than the population of hospitals, even a small amount of mean-zero measurement error in SK&A could lead to large increases in hospital ownership rates imputed from it. This is a special case of a more general class of problem associated with indirect sampling—sampling from a population related to the target population rather than the target population itself (DiGaetano, 2013).

Second, it could be that the types of relationships in the AHA survey that we classify as "ownership" fail to capture a significant number of new ownership arrangements. The AHA asks hospitals if they participate in one or more of eight different types of relationships with physicians.<sup>8</sup> For consistency with previous work, we classify hospitals as owning if they have one or more of three of these arrangements. However, because the range of ownership relationships has expanded over time, the AHA measure of ownership that we use may be too narrow.

Third, the relative complexity of the AHA survey instrument may lead it to understate the true extent of ownership. In SK&A, telephone surveyors ask respondents if physicians at the practice site if they are "affiliated" with a hospital, and then ask if their practice is owned by the hospital. In this way, SK&A's surveyors' script clearly distinguishes ownership from admitting privileges and/or other weaker forms of affiliation, but does not provide as structured set of questions as does AHA. Surveys that require respondents to choose from a complex list of options can generate different results than those that begin with a simple question and then ask about additional detail in a "tiered" fashion; this phenomenon has been extensively studied in the context of measuring individual health insurance status (e.g., Pascale, 2006).

To investigate the relative importance of these hypotheses, we calculated the share of hospitals classified as owners by SK&A that, according to AHA, had nonownership contractual relationships with physicians versus no physician relationships. We found that vast majority of "false positives" in SK&A were hospitals without any physician relationship in AHA. For example, among the 2,677 hospitals classified as owners by SK&A in 2012, according to AHA, 1,014 were owners, 315 had a nonownership physician relationship, and 1,348 had no hospital/physician relationship at all. To the extent that the second and third hypotheses would be more likely to lead to the misclassification of hospitals with some (nonownership) physician relationships rather than the misclassification of hospitals with no physician relationships, this suggests that the first hypothesis has greater explanatory power.

## Discussion

Recent trends in hospitals' ownership of physician practices have stimulated increased interest among health services researchers on this topic. However, much of this work has been based on samples of selected types of providers from selected geographic

areas, and few studies have investigated how the data underlying this work compare with more nationally representative sources. This gap is important, because understanding how practice ownership is changing across the entire population of U.S. providers is a necessary first step to developing thoughtful health policy.

In this article, we analyze data from two leading national surveys on hospital/physician relationships: the AHA survey of hospitals and the SK&A survey of physicians. We find some agreement, but also some disagreement, between these two surveys. Both agree that it is more common for a hospital to own physician practices than for a physician practice to be owned by a hospital. Both also agree that ownership of physician practices by hospitals is increasing, and that the share of physicians in practices owned by a hospital is increasing faster than the share of hospitals owning physician practices. According to the AHA, the latter phenomenon is due to the fact that most of the additional integration in recent years has been among hospitals that already owned physician practices.

The two surveys do not agree on the levels of hospital ownership. We hypothesize that the differences between surveys in the level of ownership, as measured from the physicians' perspective, are due to differences in the universe of physicians covered by the surveys. We hypothesize that the differences between surveys in the level of ownership, as measured from the hospitals' perspective, are due to measurement error created by imputing hospital ownership from the physician-based SK&A.

From the physicians' perspective, the level of ownership that we find is similar to that reported by Kane and Emmons (2013). Based on the American Medical Association's 2012 Physician Practice Benchmark Survey, they find that 23% of physicians were in practices that were at least partially owned by a hospital, as compared with our estimate of 21.1% from SK&A and 30.1% from AHA. Because the Physician Practice Benchmark Survey is designed to be a random sample of U.S. physicians, the similarity of our SK&A estimate of ownership to theirs gives us confidence in the representativeness of SK&A.

By contrast, the level and growth rates of ownership we find are lower than those reported by Robinson and Miller (2014), Kocher and Sahni (2011), O'Malley, Bond, et al. (2011), and O'Malley, Grace, et al. (2011). All of the differences can be explained by differences in the target populations of the studies' underlying surveys. Robinson and Miller (2014) find that, weighted by the number of patients, 31.7% of physicians in practices with at least 5 primary care physicians and a commercial Health Maintenance Organization contract were in practices that were owned by a hospital (patient-weighted); by comparison, our analysis of SK&A finds that 15.6% of California physicians were in a practice owned by a hospital (admission-weighted). The large difference between our SK&A estimate and theirs is likely due to their target population, which excludes small practices and those without commercial Health Maintenance Organization contracts. Kocher and Sahni (2011) analyze the MGMA Physician Compensation and Production Surveys. They find that the share of physician practices more than doubled to over 50% in 2008. However, as Kane and Emmons (2013) point out, the MGMA surveys are based on a sample of physician practices that are disproportionately large and so not representative of the entire population. Although

O'Malley, Bond, et al. (2011) and O'Malley, Grace, et al. (2011) report only qualitative results, the terms they use to describe the dynamics of ownership do not reflect our findings; quantitative analysis of ownership from the Center for Studying Health System Change data would be an interesting area for future work.

More generally, our results highlight the importance of considering data from both the hospital and physician level when investigating the causes and consequences of hospital ownership of physicians. The AHA survey, by virtue of its population base of all U.S. hospitals, is clearly dominant for purposes of analyzing ownership from hospitals' perspective. For purposes of analyzing ownership from physicians' perspective, we find that SK&A is broadly consistent with AHA and other nationally representative sources of information.

## Appendix

### *Hospital/Physician Relationships Tabulated in the AHA Survey*

1. *Independent practice association (IPA)*. A legal entity that holds managed care contracts. The IPA then contracts with physicians, usually in solo practice, to provide care either on a fee-for-services or capitated basis. The purpose of an IPA is to assist solo physicians in obtaining managed care contracts.
2. *Group practice without walls*. Hospital sponsors the formation of, or provides capital to physicians to establish, a *quasi*group to share administrative expenses while remaining independent practitioners.
3. *Open physician-hospital organization (PHO)*. A joint venture between the hospital and all members of the medical staff who wish to participate. The PHO can act as a unified agent in managed care contracting, own a managed care plan, own and operate ambulatory care centers or ancillary services projects, or provide administrative services to physician members.
4. *Closed physician-hospital organization (PHO)*. A PHO that restricts physician membership to those practitioners who meet criteria for cost effectiveness and/or high quality.
5. *Management services organization (MSO)*. A corporation, owned by the hospital or a physician/hospital joint venture, that provides management services to one or more medical group practices. The MSO purchases the tangible assets of the practices and leases them back as part of a full-service management agreement, under which the MSO employs all nonphysician staff and provides all supplies/administrative systems for a fee.
6. *Integrated salary model*. Physicians are salaried by the hospital or another entity of a health system to provide medical services for primary care and specialty care.
7. *Equity model*. Allows established practitioners to become shareholders in a professional corporation in exchange for tangible and intangible assets of their existing practices.
8. *Foundation*. A corporation, organized either as a hospital affiliate or subsidiary, which purchases both the tangible and intangible assets of one or more

medical group practices. Physicians remain in a separate corporate entity but sign a professional services agreement with the foundation.

### **Declaration of Conflicting Interests**

In the last 3 years Baker has received consulting fees from the California Health Care Foundation, the American Hospital Association, the National Institute for Health Care Management, LabCorp of America, Quality Systems Inc., Kaiser Permanente and other health insurers, hospitals and producers of medical supplies and equipment, and Cornerstone Research. He has received grant support from the American Heart Association, the National Institutes of Health, the Agency for Healthcare Research and Quality, the Robert Wood Johnson Foundation, and the National Institute for Health Care Management. He is a senior advisor at Cornerstone Research, a provider of litigation consulting services. In the last three years, Bundorf has received consulting fees from AON Service Corporation and Quinn Emanuel Urquhart and Sullivan, LLP. She has received grant support from the Agency for Healthcare Research and Quality, the National Institute of Health Care Management, the Patient Centered Outcomes Research Institute, and the Robert Wood Johnson Foundation. In the last three years, Kessler has received speaking and/or consulting fees from the California State Compensation Insurance Fund, other insurers, Aon Hewitt, Sutter Health, and other hospitals. He is a senior advisor at Cornerstone Research, a provider of litigation consulting services

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### **Notes**

1. SK&A is now a subsidiary of IMS Health.
2. <http://www.ahadataviewer.com/about/data>.
3. However, the double-counting issue is empirically unimportant. The average number of ownership relationships per owned physician in SK&A was 1.012 in both 2008 and 2012 (not in any table).
4. Of the 277,090 physicians in the 2008 SK&A sample, 235,982 (85.2%) also appear in the 2012 sample, showing that the sample's expansion was not accompanied by a significant change in the composition of the base.
5. In the AHA survey, the proportional change is  $0.824 = 13.6\%/16.5\%$ ; in the SK&A/IMS survey, the proportional change is  $0.851 = 9.7\%/11.4\%$ .
6. Because the AHA survey does not identify the ownership status of individual physicians, we cannot weight physicians' ownership status, as measured by AHA, by the number of patients the physicians admit.
7. If anything, SK&A likely understates the extent to which additional integration has occurred in already owning hospitals: The 2008 SK&A sample of physicians was significantly smaller than the 2012 sample, and so likely failed to identify some hospitals that were actually already owning in that year.
8. See the appendix for a list of the eight relationships included in the AHA Survey.

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