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RESEARCH BRIEF

Physician Competition in the Era of Accountable Care Organizations

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Objective. To calculate physician concentration levels for all U.S. markets using detailed data on integration and accountable care organization (ACO) participation.

Data Source. 2015 SK&A office-based physician survey linked to all commercial and public payer ACOs.

Study Design. We construct three separate Herfindahl–Hirschman Index (HHI) measures and plot their distributions. We then investigate how prevailing levels of concentration change when incorporating more detailed organizational features into the HHI measure.

Principal Findings. Horizontal and vertical integration strongly influences measures of physician concentration; however, ACOs have limited impact overall. ACOs are often present in competitive markets, and only in a minority of these markets do ACOs substantively increase physician concentration.

Conclusions. Monitoring ACO effects on physician competition will likely have to proceed on a case-by-case basis.

Key Words. Physician markets, physician integration, accountable care organizations, physician competition, physician consolidation

Accountable care organizations (ACOs) are one of several prominent payment and delivery innovations spreading throughout the U.S. health care system. Their aim is to better align provider financial incentives with achieving desired patient health outcomes (Abrams et al. 2015). Despite their extensive attention among researchers and policymakers, early ACOs have had mixed success (Abrams et al. 2015; McWilliams et al. 2015, 2016; Nyweide et al. 2015). This has not halted the proliferation of both commercial and public payer ACO models, however, and some worry that their growing popularity may have perverse consequences—such as antitrust issues.

Existing research shows that tighter integration between hospitals and physician practices (Baker, Bundorf, and Kessler 2014a) as well as consolidation among physicians (Austin and Baker 2015; Baker et al. 2014b; Kleiner, White,

and Lyons 2015) can lead to higher health care prices and spending. As ACOs deliberately encourage closer business relationships between otherwise separate entities, some have voiced concerns over the potential risks of ACOs' driving anticompetitive behavior in health care markets (Brill 2015; DeCamp 2013; Frech et al. 2015; Greaney 2011; Lieberman 2011). Yet we have little empirical guidance on the pervasiveness or magnitude of such an issue. We know that ACOs are often found among more populated, urban locales (Muhlestein 2015; Lewis et al. 2013), and the formation of ACOs, at least early on, appears linked to the market structure of physicians, hospitals, and insurers (Frech et al. 2015)—including the prevalence of provider integration (Auerbach et al. 2013). However, none of these existing works informs the research or policy communities as to if and how ACOs are currently changing the competitive health care landscape across the United States.

We use the near universe of physician practices and ACO models operating in 2015 to explore the influence of these new delivery models on the prevailing levels of market concentration for physician services.

Data

Both physician datasets are from a commercial research firm (SK&A). The primary dataset is a survey of all office-based physician practices across the United States in 2015 and includes 274,479 unique practices and 599,096 unique physicians. Practices are categorized by their specific specialization (in the case of single-specialty practices) or multispecialty status. Individual physicians are classified by their primary specialization, with <0.1 percent missing specialty information. The survey also provides detailed information on practice location (zipcode level) as well as horizontal and vertical integration arrangements (i.e., affiliations with physician groups or integrated health systems, respectively). The latter information has been used to study integration behavior in the literature (e.g., Richards, Nikpay, and Graves 2016), and more broadly,

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SK&A data are increasingly used in research (e.g., Auerbach et al. 2013; Gresenz, Auerbach, and Duarte 2013; King, Furukawa, and Buntin 2013).

The supplementary dataset (also from SK&A) comes from a second survey focused on all ACOs operating in the United States, irrespective of payer type (i.e., commercial or public insurance ACOs). The dataset captures information on 652 unique ACOs and can be linked to the primary dataset at the practice and individual physician levels—of which 64,098 and 174,868 participate in one or more ACOs, respectively.

METHODS

Constructing Physician Concentration Measures

We construct three different measures of a Herfindahl-Hirschman Index (HHI) for physician markets. We then qualitatively compare the degree of market concentration across all U.S. markets using each of the three HHI measures. Each measure reflects the allocation and organization of all physician specialists within a given geographic area. In other words, we capture if an insurer would have relatively few or many physician practices to negotiate with in regard to enrollee access and payments (as well as other contractual terms).

We narrow our attention to three specialty groups: adult primary care physicians (PCPs: family, general, and internal medicine), cardiologists, and orthopedic surgeons. These specialties span the primary care, medicine subspecialty, and surgical domains of medical care, and the former two specialties are likely to play substantive roles within most ACO structures—given the emphasis to better manage patients with chronic disease. The latter specialty (orthopedic surgery) is one of the most common surgical fields represented in the ACO data. We investigate each physician specialty group of interest in isolation.

To construct the first and second HHI versions for each specialty (six separate HHIs in total), we first restrict the full physician data (primary data source) to the relevant single-specialty practices or multispecialty practices with at least one physician on staff that has the relevant specialty as his/her primary field of practice.¹ We then calculate the total number of relevant specialists in the practice and the total number of relevant specialists in the geographic area belonging to our market definitions. We use primary care service areas (PCSAs) for adult PCP market boundaries and hospital referral regions (HRRs) for cardiology and orthopedic surgery markets. Both sets of boundaries are from the Dartmouth Atlas, and we justify the use of HRRs due

to the reliance on hospital-based care for many cardiology and surgical services. The first HHI measure treats each individual practice as a separate entity or firm. Thus, we divide each practice's total number of relevant specialists by the total number available in the market. This gives us an "own share" measure for each physician firm (i.e., practice), which we inflate by a factor of 100 and square. Summing all of the squared shares in a given market generates the corresponding HHI, with a maximum value of 10,000 (monopoly market).

Our second version of the HHI proceeds similarly; however, we now introduce physician group and integrated health system ownership information. Consequently, the physician practices belonging to our first HHI version are combined within a market when they share common ownership (i.e., they are horizontally or vertically integrated).² This adjusts the numerator in our "own share" calculations and provides a richer measure of physician concentration as insurers likely negotiate with the larger (more powerful) entity, as opposed to its individual practice subcomponents.

The third HHI version builds off of the second version by incorporating 2015 ACO participation information. We first link the physician-level ACO data to the primary data source. Of note, 4.5 percent of physicians participate in more than one ACO, and we allocate these physicians to their largest ACO (in terms of total participating physicians) before joining the two datasets. We then treat an ACO affiliation as the highest organizational level for a given physician. Hence, all physicians previously allocated to a unique practice, physician group, or integrated health system identifying as part of a particular ACO are redistributed to that ACO. Physicians not participating in any ACO maintain their organizational status belonging to our previous HHI calculation. This third and more refined version of the "own shares" measures subsequently reflects physician participation in structures that can span multiple organizations (i.e., an ACO). With this modified physician organizational taxonomy, we derive our final version of the HHI measure and plot the density of HHI values for each version to examine whether and how the distributions change when using alternative HHI constructions.

Distribution of ACOs across Markets and Relative HHI Changes across Measures

Our final empirical exercise explores how ACOs are allocated across markets according to their prevailing levels of concentration and then the degree of HHI value change in these same markets when moving from the second to the third version of our HHI measures.

We begin by restricting to ACOs with at least one of the relevant physician specialists as a member. As a single ACO can span multiple market boundaries, with some markets having few or none of the relevant physician specialists located within them, we collapse a unique ACO to its market observation that has the greatest density of the physician specialist among all markets where it has a presence. This process generates a unique ACO–market pair, except in the rare instance of a tie (i.e., more than one market has the same number of relevant physician specialists belonging to the same ACO). In the event of a tie, we allow an ACO to have multiple market observations (small minority of cases).

After identifying these “influential” markets (i.e., individual ACOs coupled to their markets with the greatest number of physician specialists of interest), we assess how they are allocated according to the degree of market concentration using the second version of our HHI measure. This reveals whether ACOs are more likely to be located within relatively competitive versus uncompetitive markets using accepted Department of Justice (DOJ) and Federal Trade Commission (FTC) cutoffs of less than 1,500 (unconcentrated market), 1,500–2,500 (moderately concentrated market), and above 2,500 (highly concentrated market). Finally, we use this same collapsed data on influential markets to calculate the numerical change in HHI when moving from the second to third version of our HHI measures in these markets (i.e., subtracting the latter HHI from the former for each included market). We can subsequently use this information to qualitatively understand whether the presence of ACOs in these markets substantively alters the competitive landscape as defined by HHI levels.

We note that ACO penetration at the practice level is incomplete (i.e., not all physicians within a practice will be attached to an ACO). For single-specialty practices in our three physician specialty domains, 4–10 percent have ACO participation between 0 and 100 percent. Among multispecialty practices, it ranges from 16 to 27 percent. Because of these cases with nonuniform ACO participation, inclusion of the ACO information (third measurement version) can reduce the prevailing HHI in a given market.³

RESULTS

Figure 1A displays the density plots for adult PCP market concentration using our three versions of the HHI measure. The most naïve HHI measure

Figure 1: (A–C) HHI Market Concentration Measures for Adult Primary Care Physicians (PCPs, “A”), Cardiologists (“B”), and Orthopedic Surgeons (“C”) in 2015 with Increasing Levels of Organizational Complexity

Notes: Data on 2015 physician practices and ACO participation from SK&A. Adult PCPs (“A”) include family, general, and internal medicine single-specialty practices as well as multispecialty practices with at least one physician with such a specialty. Adult PCP markets are defined by PCSAs. Cardiologists (“B”) include all single-specialty cardiology practices as well as multispecialty practices with at least one physician that specializes in either cardiology or pediatric cardiology. Cardiology markets are defined by HRRs. Orthopedic surgeons (“C”) include all single-specialty orthopedic surgery practices as well as multispecialty practices with at least one physician that specializes in either orthopedic surgery, orthopedic reconstructive surgery, foot and ankle surgery, hand surgery, or orthopedic spine surgery. Orthopedic surgery markets are defined by HRRs. “Version1” considers each physician practice an independent entity (or firm). “Version2” accounts for organizational affiliations (i.e., horizontal integration within a physician group or vertical integration within an integrated health system). “Version3” incorporates ACO affiliations as well.

(Version 1) that neglects organizational groupings expectedly indicates that the greatest mass of the distribution falls among HHI values below 2,000—suggesting fairly competitive markets. However, incorporating organizational information (Version 2) reveals more market concentration for adult PCPs, but the presence of ACOs (Version 3) has minimal impact and only over a narrow range (HHI values less than 4,000).⁴ Figure 1B and C (cardiology and orthopedic surgery, respectively) takes on similar patterns. The first HHI version gives the false impression that these specialty markets are competitive, but the density plot is markedly different when moving to the second HHI version that accounts for horizontal and vertical integration. Again, incorporating ACO affiliations has limited influence for either distribution (Figure 1B and C). Hardly any cardiologists or orthopedic surgeons practice in very concentrated markets (e.g., HHI values above 6,000), which is consistent with the literature on location theory for highly specialized physicians (Newhouse et al. 1982; Newhouse 1990). The relatively greater degree of primary care concentration may also reflect additional strategic motives specific to the

Figure 2: Distribution of ACOs by HHI Groupings Using the Organizational Information (without ACO) Market Concentration Measure

Notes: The x-axis HHI ranges map to DOJ cutoffs for degree of market concentration. These HHIs are from the second version of our HHI calculations (i.e., using the information on practices' horizontal and vertical integration but not incorporating ACO affiliations). Each specialty-specific count restricts to ACOs with at least one of the specialists contained within it. For ACOs spanning multiple markets, we use the market observation with the greatest density of corresponding specialists. In the event of a tie (i.e., more than one market having an equal number of the specific specialists for the same ACO), we keep the multiple market observations for the given ACO.

specialty—for example, organizations aiming to capture PCP referrals for specialized care or hospital admissions.

Figure 2 shows how ACOs using these different physician specialists are allocated across markets according to the second version of our HHI measures. Interestingly, more than half of ACOs operating in 2015 are located in markets that would be considered competitive (when focusing on organizational affiliation) for each physician specialty. Thus, the muted distributional shifts shown in Figure 1A–C are not due to ACOs exclusively populating already heavily concentrated markets. The majority of ACOs we observe have their greatest density of specific physician specialists in unconcentrated markets. This contrasts with prior work showing ACO presence to be negatively correlated with the number of physician groups in a market (Lewis et al. 2013)—although Frech et al. (2015) find the opposite. However, both of these

Figure 3: Distribution of Adult PCP Changes in HHI Values for Affected Markets When Incorporating ACO Affiliations

Notes: *x*-axis strata are DOJ HHI cutoffs for degree of market concentration, and these are from the second version of our HHI calculations (i.e., using the information on practices' horizontal and vertical integration but not incorporating ACO affiliations). Reported values (scatter dots) within each stratum are change in HHI between the second and third versions of our HHI calculations (i.e., using practices' horizontal and vertical integration information *and* incorporating ACO affiliations). Affected markets are those with at least one ACO containing the corresponding physician specialist, and we again restrict ACOs spanning multiple markets to the market observation with the largest density of the given specialist—except in the event of a tie, in which case more than one market observation for a given ACO is allowed.

studies focus on a much earlier period of ACO formation (2011–2012), with less than half the number of ACOs we observe. The considerably different landscape challenges direct comparability with our contemporary snapshot—for example, ACOs may have spread to new market environments in the intervening years. We also provide supplementary results to Figure 2 in Table S1. Although a full investigation into the similarities and differences between commercial (i.e., private insurer) and noncommercial (e.g., Medicare or Medicaid) ACO contracts is beyond the scope of this work, we can see that they are present in a very similar array of markets—at least according to prevailing concentration levels.

Figure 3 goes a step further to quantify how much the HHI values are adjusted when moving from the second to third versions of the measure (i.e., subtracting one from the other), with markets stratified by their levels of

Figure 4: Distribution of Cardiology Changes in HHI Values for Affected Markets When Incorporating ACO Affiliations

Notes: x-axis strata are DOJ HHI cutoffs for degree of market concentration, and these are from the second version of our HHI calculations (i.e., using the information on practices' horizontal and vertical integration but not incorporating ACO affiliations). Reported values (scatter dots) within each stratum are change in HHI between the second and third versions of our HHI calculations (i.e., using practices' horizontal and vertical integration information *and* incorporating ACO affiliations). Affected markets are those with at least one ACO containing the corresponding physician specialist, and we again restrict ACOs spanning multiple markets to the market observation with the largest density of the given specialist—except in the event of a tie, in which case more than one market observation for a given ACO is allowed.

concentration and DOJ cutoffs according to organizational affiliation (Version 2 HHI measure). For adult PCPs across all three classifications, the median change is small, and it is not until reaching the top quartile of the distribution of HHI value differences that the changes seem qualitatively important. Where these large changes are likely to matter the most are in the less concentrated markets (i.e., 2,500 or less). For affected adult PCP markets that are competitive (<1,500) or moderately competitive (1,500–2,500), having an HHI adjustment due to ACO affiliations in the 75th or 90th percentile of the distribution is likely to shift the market to a new (more concentrated) classification. While this only affects a subset of markets, it has potential implications for provider–payer negotiations taking place within this minority of cases. A similar set of data patterns and implications emerges for cardiology and orthopedic surgery markets in Figures 4 and 5, with the distinction that large

Figure 5: Distribution of Orthopedic Surgeon Changes in HHI Values for Affected Markets When Incorporating ACO Affiliations

Notes: *x*-axis strata are DOJ HHI cutoffs for degree of market concentration, and these are from the second version of our HHI calculations (i.e., using the information on practices' horizontal and vertical integration but not incorporating ACO affiliations). Reported values (scatter dots) within each stratum are change in HHI between the second and third versions of our HHI calculations (i.e., using practices' horizontal and vertical integration information *and* incorporating ACO affiliations). Affected markets are those with at least one ACO containing the corresponding physician specialist, and we again restrict ACOs spanning multiple markets to the market observation with the largest density of the given specialist—except in the event of a tie, in which case more than one market observation for a given ACO is allowed.

differences in HHI values are not evident until very far into the right tail of the distribution (90th percentile).

DISCUSSION

There are potential advantages and disadvantages from policies and payment reforms that encourage greater provider integration. One concern voiced by some is the potential to reduce market competition. Our empirical investigation indicates that formal integration (horizontal and vertical) among physician practices dramatically alters the prevailing level of measured concentration among various specialists (via HHIs). Yet layering on ACO affiliations—which can span multiple organizations—does not substantively change the competitive landscape for physician services on the whole. The reasons are likely threefold. First, ACOs are still a small (although growing) organizational feature of U.S. health care markets. Less than a quarter of practices report ACO involvement in our data. Second, ACOs may arise within an already existing, large organization (e.g., an integrated health system), resulting in assumption of financial risk without materially changing payer–provider negotiation leverage. Third, some ACOs exist in markets that are already highly concentrated, which blunts any risk of anticompetitive effects from further provider integration.

That said, ACOs can be found in markets with many competing relevant physicians, and our findings reveal that a subset of these markets are influenced by the presence of ACOs—even moving into a higher classification of market concentration. Thus, the implications of ACOs for market concentration are potentially greatest in the “tails”—meaning the relatively few markets that are competitive in terms of provider organizational groupings but have the biggest adjustments to HHI due to subsequent ACO affiliations. This suggests that a policy or regulatory approach toward monitoring competition in the wake of ACO development would likely have to proceed case by case, not unlike current DOJ and FTC approaches to hospital and insurer mergers. Uniformly encouraging or restraining further ACO growth in the interest of provider competition is likely to miss the idiosyncratic and isolated impacts that will apply to particular markets.

Finally, whether and how ACOs alter contracting dynamics between unaffiliated providers and insurers and whether ACOs encourage greater formal integration among providers remain open and crucial questions. Table S2 shows that physician practices being taken over by integrated

health systems are also more likely to start participating in ACO contracts over the same period. Nonetheless, the precise timing of these events remains poorly characterized, and importantly, the range of strategic motives that may underlie ACO formation decisions will require further research and policy attention as well.

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NOTES

1. Multispecialty practices with at least one physician who specializes in either cardiology or pediatric cardiology are included in the cardiology-focused measures. Multispecialty practices with at least one physician that specializes in orthopedic surgery, orthopedic reconstructive surgery, foot and ankle surgery, hand surgery, or orthopedic spine surgery are included in the orthopedic surgery-focused measures.
2. We allocate a given physician practice to the highest level of organization reported in the data.
3. As an example, imagine a monopoly market for cardiology where one practice has two cardiologists within it. If one of the two cardiologists in that market joins an ACO, then the market will now have two “firms” in the market as the practice has been effectively split. Thus, the HHI version including ACO information would be smaller (less concentration) than the version ignoring ACO participation.
4. There are a nontrivial number of PCSAs with monopoly markets as shown in Figure 1, which is not the case for our two more specialized physician fields (cardiology and orthopedic surgery). This is likely due to the greater geographic dispersion of PCPs and the presence of PCPs in relatively rural areas—where they may operate as monopoly or near-monopoly providers to a sparse population.

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SUPPORTING INFORMATION

Additional supporting information may be found online in the supporting information tab for this article:

Appendix SA1: Author Matrix.

Table S1. HHI Distribution When Using the Organizational Information (without ACO) Market Concentration Measure and Stratified by "Commercial" ACO Contract Status.

Table S2. Changes in ACO Participation for Physician Practices from 2013 to 2015.