Health Data for Action Full Proposal Narrative
Project Title: Effects of Price Transparency on Private Equity Acquisitions and Healthcare Prices: Evidence from Physician Groups and Outpatient Practices
Proposal I.D.: 128546
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1. Research Questions

I propose to use Transparency in Coverage Data and the Colorado All Payer Claims Database (APCD) outpatient claims to investigate how private equity (PE) acquisitions of physician groups changed following federal price transparency regulations. I will study PE acquisitions before and after the Center for Medicare and Medicaid Services (CMS) Transparency in Coverage Rule ("price transparency") and investigate five related questions:

1) Did the number or size of PE acquisitions of physician practices change after price transparency?
2) After price transparency, were PE acquisitions of physician practices concentrated among low priced providers?
3) How did prices of acquired practices change following acquisition?
4) In Colorado, did PE acquisitions of physician practices become more concentrated among low priced providers after price transparency?
5) In Colorado, did price changes after PE acquisition change from before to after price transparency?

These research questions will provide policy makers with evidence on the interaction of two recent major changes in health care markets, price transparency and increasing acquisitions of physician practices by PE firms. Each of these changes has been studied separately, but much less is known about the interaction between the two.

CMS's price transparency regulations were intended to reduce health care prices and costs by providing consumers with information to consider prices when selecting health care providers, thus inducing price competition and lower prices.[1] However, because the rule required prices to

be publicly accessible, actors other than consumers could use the newly available price information to inform their actions in health care markets. This study will investigate whether PE firms specifically appear to be using the information made available via price transparency.

The price information may change the behavior of PE firms by allowing them to identify providers and practices that are paid low prices by commercial insurers relative to other similar providers in the same market. These providers are particularly attractive acquisition targets for PE firms because the PE firm may be able to acquire the firm at a purchase price based on past revenue (which would be low due to low relative prices), but then increase prices by demanding the prevailing market price from commercial insurers. This ability to raise prices and make profit only increases if the PE firm can acquire numerous providers in a market, giving the firm the market power to negotiate for higher prices, or if the PE firm can reduce costs to the practice.

This research requires the data made available through the Health Data for Action award, specifically the negotiated prices prior to price transparency available via the CO APCD. Combined with the Transparency in Coverage data, the research will use this novel data to generate evidence on whether this hypothesized association between price transparency and PE acquisitions appears to exist. This evidence is important, significant, and policy relevant information given stated goals of CMS and other health policy agencies, including those in Colorado, to reduce health care costs and prices and increase value. The research is also relevant to the Federal Trade Commission (FTC), Department of Justice (DOJ), and Department of Health and Human Services (HHS) given these agencies' increased scrutiny of PE acquisitions in health care markets.[2] Federal and state policymakers will be able to use the results of this research to guide future health policy and anti-trust policy decisions.

2. Prior Analyses and Research Studies

The effects of earlier price transparency policies and the effects of PE acquisitions have both been investigated in prior academic literature. This study will advance this literature in two ways. First, CMS's Transparency in Coverage Rule is a nation-wide rule and is much larger in scope

than the insurer, employer, or state specific price transparency policies that have been studied in prior work. Second, this study will specifically investigate how price transparency and PE acquisitions interact to affect health care markets, rather than studying either change in isolation.

Prior academic work on price transparency has primarily focused on consumer responses to interventions that provided a subset of a market (e.g. members of a specific insurance plan or employees of a specific company) with price information. This work has generally found small or no effects because consumers do not appear to use the price information made available to them.[3-8] However, consumer induced price competition may be more important if an entire market of consumers has price information. Alternatively, prices could increase due to supplier collusion, the PE led consolidation that this project will investigate, or other mechanisms.

Some recent work has evaluated market-wide price transparency interventions for outpatient services, finding small effects, again due to low consumer use of the information.[9,10] An in-progress working paper documents effects of a recent randomized controlled trial of billed charge (list price) transparency for outpatient services in New York state and found 1-6% price increases for less elective, always insured services and 2-3% price decreases for more elective, less frequently insured services.[11] This shows the potential for price increases after transparency.

Prior work on PE acquisitions in health care shows an increasing pace of acquisitions, describes characteristics of acquired practices, and documents price increases, increased unique patients seen, and increased total patient volume following PE acquisition.[12,13] Other work studied PE acquisitions and changes in outpatient practice labor force composition,[14] hospitals,[15,16] nursing homes,[17] ambulatory surgical centers,[18] or practices in single specialties.[19] A recent systematic review describes these and other studies of the trends and impacts of PE acquisitions of health care providers. However, this existing literature has primarily focused on describing trends and on changes in outcomes following PE acquisition. Rather than only changes after PE acquisitions, the proposed study also investigates PE acquisitions as an outcome, specifically studying how a policy change (price transparency) is associated with changes in PE acquisitions.

3. Project Approach and Methodology

3.1 Data Sources

This study would combine four data sources to study the association of price transparency with changes in PE acquisitions of physician practices and changes in prices after acquisitions.

1. Transparency in Coverage

   The first data source would be the Serif Health Transparency in Coverage data made available via the Health Data for Action (HDA) award. This data includes negotiated prices paid by insurers to providers for health services and identifying information and characteristics about those providers. Specifically, the data include Employer Identification Number (EIN), National Provider Identifiers (NPI), entity (provider) name, entity address, and the price and HCPCS or CPT code for each service.

2. Practice Ownership

   The second data source would be CMS's Provider Enrollment, Chain and Ownership System (PECOS) data which includes NPI, provider name and specialty, organization name, and location. I will submit a Freedom of Information Act Request for the PECOS database to CMS, but the information in the dataset is publicly available.[20] Searching by NPI provides the name of any group with whom an individual provider is affiliated.

3. Private Equity Acquisitions

   Data on PE acquisitions will come from several sources. First, I will use a publicly available database of 600 PE acquisitions assembled by Kaiser Health News.[21] Next, I will conduct searches for acquisitions of the providers or group names identified in the practice ownership data in Capital IQ, PitchBook, Preqin, and SDC Platinum, as well as general search engines. These are four databases used in prior research to identify PE acquisitions in health care and are available to me via the Duke library system. I will also conduct searches for the PE firms included in the Kaiser Health News data, and those identified in my additional searches for medical groups to identify other acquisitions by these firms.

4. Colorado All Payer Claims Database (CO APCD)

   The final data source would be the CO APCD, via HDA, which includes negotiated prices, provider identifiers (NPI), and patient cost sharing data. Crucially, the data includes negotiated prices prior to price transparency regulations, which will allow a more complete analysis of the effects of transparency on PE acquisitions and combined price effects.

3.2 Data Linking & Applicant Experience

Transparency in Coverage, PECOS, and APCD data will be linked by NPI and if necessary, provider/practice name and address. This data will be linked to PE acquisition data by entity name, address, and ownership, as in prior studies of PE in healthcare.[22] I have over five years of experience working with health insurance claims data similar to those in the CO APCD, and I am currently working with inpatient data from the CO APCD studying hospital price transparency. Multiple members of my committee have worked with price transparency, PECOS, and PE acquisition data to study the effects of PE acquisitions and other ownership transitions on prices, quality, and other outcomes. I am confident that I have the technical skills, experience, and support to use the above data to successfully conduct the proposed research.

3.3 Empirical Analysis

The study will use interrupted time series and difference-in-differences models. To test whether the number or size of PE acquisitions increased after transparency, I will estimate:

$$A_t = \alpha_0 + \alpha_1 t + \alpha_2 \text{After} + \alpha_3 \text{After} \times [t - \text{July } 2022] + \varepsilon_t \quad (1)$$

A_t measures the number (or size) of acquisitions in month t, After is an indicator equal to 0 in months before price transparency regulations and 1 after (e.g. after July 2022). α_0 estimates the baseline intercept of acquisitions per month, α_1 estimates the pre-transparency slope (change) in acquisitions per month for 1 month of passing time, α_2 estimates the level shift when price transparency in implemented, and α_3 estimates the change in the slope of acquisitions per month

after price transparency.[23] I will also explore autoregressive moving average (ARIMA) models to address potential autocorrelation.[24]

Next, I will test whether acquisitions after transparency were concentrated in low-priced medical groups or physician practices by estimating:

$$A_{it} = \beta_0 + \sum_{j=1}^{4} \beta_j \mathbb{1}_{[Q_{it_{-1}}=j]} + \beta_k \boldsymbol{X_{it_{-1}}} + \varepsilon_t \quad (2)$$

Here, A_{it} is an indicator equal to 1 if group/practice i has been acquired by a PE firm and 0 otherwise. $\mathbb{1}_{[Q_{it_{-1}}=j]}$ is an indicator function equal to 1 if the average price of group/practice i in the prior period was in quintile j. $\boldsymbol{X_{it_{-1}}}$ is a vector of practice and time varying characteristics and fixed effects. β_1 measures the difference in probability of acquisition of a group/practice in the first quintile of the price distribution relative to fifth (omitted) quintile. A positive coefficient supports the hypothesis that PE firms focus on acquiring low priced practices.

Third, I will study whether prices increase following PE acquisitions by estimating:

$$P_{ist} = \gamma_0 + \gamma_1 \mathrm{Treated_i} + \gamma_2 \mathrm{Post_{it}} + \gamma_3 \mathrm{Treated_i} \times \mathrm{Post_{it}} + \gamma_k \boldsymbol{X_{it}} + \varepsilon_{it} \quad (3)$$

P_{ist} is the price at provider i for service s in time t. $\mathrm{Treated_i}$ is an indicator for whether provider i is ever acquired by a PE firm and $\mathrm{Post_{it}}$ is an indicator for whether period t is after the acquisition of practice i. γ_3 is then the two-way fixed effects (TWFE) estimate of how prices change after PE acquisition. I will also estimate modern alternatives to the TWFE estimator.

Next, I will turn to Colorado specific analyses using the CO APCD, which as noted above includes pre-transparency prices, which allows a comparison of the prices of acquired practices and price changes associated with acquisitions before and after price transparency. First, I will re-estimate equation (1) limiting to Colorado acquisitions to examine whether trends in Colorado differ from national trends. Next, I will estimate whether the position of acquired practices in the price distribution changed following price transparency by estimating:

$$A_{it} = \delta_0 + \sum_{j=1}^{4} \delta_j \mathbb{1}_{[Q_{it_{-1}}=j]} + \delta_k \boldsymbol{X_{it_{-1}}} + \mathrm{Post_t} \left(\theta_0 + \sum_{j=1}^{4} \theta_j \mathbb{1}_{[Q_{it_{-1}}=j]} + \theta_k \boldsymbol{X_{it_{-1}}} \right) + \varepsilon_t \quad (4)$$

Where variables are defined as in equation (2) above, and $\mathrm{Post_t}$ indicates whether month t is after price transparency regulations were in effect. Then the δ parameters measure the association of explanatory variables with acquisition probabilities prior to price transparency and θ parameters measure whether those associations changed after price transparency. θ_1-θ_4 are the primary coefficients of interest, measuring whether the association of the position of a provider in the price distribution on acquisition probabilities changed after price transparency. A positive coefficient on θ_1 would indicate that acquisitions after price transparency were more concentrated in the bottom quintile of the price distribution than acquisitions before price transparency.

Next, I will estimate a triple difference model to study whether the magnitude of price increases following a PE acquisition changed after price transparency. I will estimate:

$$P_{ist} = \mu_0 + \mu_1 \mathrm{T_i} + \mu_2 \mathrm{P_{it}^A} + \mu_3 \mathrm{T} \times \mathrm{P_{it}^A} + \mu_k \boldsymbol{X_{it}} + \mathrm{P_t^T}\left[\eta_0 + \eta_1 \mathrm{T_i} + \eta_2 \mathrm{P_{it}^A} + \eta_3 \mathrm{T} \times \mathrm{P_{it}^A} + \eta_k \boldsymbol{X_{it}}\right] + \varepsilon_t \quad (5)$$

Where $\mathrm{T_i}$ indicates that practice i was ever acquired by a PE firm (treated), $\mathrm{P_{it}^A}$ indicates that month t is after (post) the acquisition (A) of practice i, and $\mathrm{P_t^T}$ indicates that month t is post transparency. P_{ist} is again the price and $\boldsymbol{X_{it}}$ contains time varying practice characteristics and fixed effects. η_3 is the estimate of the triple difference, whether the change in price following a PE acquisition changed after price transparency. Unlike the Transparency in Coverage data, the CO APCD also includes patient cost sharing. I will estimate a version of equation (5) with patient cost, rather than total negotiated price, as an outcome to study the effects of price transparency and PE acquisitions on patient costs.

4. Deliverables

The results of this research will be of direct use to policymakers in Colorado working to control health care prices and preserve affordability and accessibility of health care for Coloradans. The results will provide evidence on how two major recent changes in health care markets, price transparency and increasing ownership of physician practices by PE firms, interact with each other and are related to prices of health care in Colorado and the patient cost burden of that care.

The target audiences for this research include policy makers, providers, insurers, and health policy and health economics scholars. I plan to submit my results for inclusion in the Duke Margolis Center for Health Policy newsletter, which reaches over 7,000 health policy stakeholders in North Carolina and nationally. I would also be interested in writing a blog post or other research summary for the Center for Improving Value in Health Care (CIVHC), who administers the CO APCD. I would be willing to share results with RWJF throughout the project prior to publication. I plan to submit to present at health economics and health policy conferences, including the American Society of Health Economists annual conference, and the Association for Public Policy & Management research conference, the Allied Social Sciences Association annual meeting. After incorporating feedback from these venues, I plan to submit a manuscript for publication in health policy and medical journals.

5. Applicant Qualifications, Expertise, and Demonstrated Support

I am a fifth-year doctoral candidate at Duke University in Public Policy & Economics and a medical student in the Duke School of Medicine Medical Scientist Training Program. I have over five years of experience conducting research with health care claims data and am currently conducting research on hospital price transparency regulations using the inpatient claims of the CO APCD.

Duke has the resources necessary to carry out this project. Sensitive health care data (CO APCD) will be stored on a secure protected network for research managed by the Duke Office of Information Technology and designed for research with sensitive data such as health care claims. I do not require an accompanying financial award; I will be supported by a fellowship or teaching assistant position during the study period.

6. Barriers and Limitations

The most difficult steps in the proposed research are 1) identification of PE acquisitions of health care providers and 2) linking acquisitions to Transparency in Coverage and CO APCD data. I already have data on 600 acquisitions via the Kaiser data and have proposed to complete these steps with methods successfully used in prior work. I will continue to pursue additional sources of

data and additional methods to identify and link acquisitions, such as access to additional merger and acquisition or provider ownership databases. I will also continue to work with faculty at Duke who study the effects of ownership on health care providers to develop and implement improved methods to identify and link PE acquisitions.

A second limitation is that the empirical methods can document associations but do not provide causal evidence of the effects of either price transparency or PE acquisitions. This is because price transparency was a national policy implemented at one point in time, so it is difficult to construct a control group for causal identification. Similarly, PE acquisitions are an endogenous choice of PE firms (and likely also the acquired practice), so acquired and not acquired providers may be different in unobservable ways that could affect outcomes. I will address these limitations by implementing the most rigorous possible version of the proposed analyses, controlling for observables and trends. I will also continue to follow the literature on both acquisitions and transparency to stay up to date on novel causal identification strategies relevant to the proposed research questions.

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