

# **New Evidence on the Compensation of Chief Executive Officers at Non-Profit U.S. Hospitals: Appendix**

## **1. Additional details on compensation measures**

Although our compensation measure captures the total value of the compensation package for CEOs at both non-profit and for-profit organizations, the underlying components are different due to differences in reporting requirements. Non-profits are required to report three forms of compensation on Form 990: same-organization compensation, compensation from a related organization, and other compensation from both same-organization and related organizations. 69% of CEOs in our non-profit hospital sample report same-organization compensation, 34% report compensation from related organizations, and 91% report other compensation.

For-profit reporting rules require more detailed categorical reporting of compensation for SEC filings, including salary, bonus, stock awards, option awards, non-equity incentive plan compensation, the change in pension value and nonqualified deferred compensation earnings, and other compensation. 76% of CEOs in our for-profit hospital sample reported salary, 12% reported bonus, 65% reported stock awards, 35% reported option awards, 71% reported non-equity incentive plan compensation, 53% reported change in pension value and nonqualified deferred compensation earnings, and 41% of CEOs reported other compensation.

### **1.1 GuideStar compensation definitions**

Form 990 defines compensation as follows: all forms of cash and noncash payments or benefits provided in exchange for services, including salary and wages, bonuses, severance payments, deferred payments, retirement benefits, fringe benefits, and other financial arrangements or transactions such as personal vehicles, meals, housing, personal and family educational benefits, below-market loans, payment of personal or family travel, entertainment, and personal use of the organization's property. This value of same-organization compensation is reported on Form W-2, box 1 or 5 (whichever amount is greater) and Form 1099-MISC, box 7.

Organizations must also report compensation from related organizations. Related organizations generally consist of parents, subsidiaries, brother/sister organizations, supporting organizations, supported organizations, sponsoring organizations of voluntary employees' beneficiary associations (VEBA), and contributing employers to VEBAs.

Other compensation includes compensation other than reportable compensation, including deferred compensation not currently reportable on Form W-2 or Form 1099-MISC, and certain nontaxable benefits. Specific forms of compensation in this category include: 1) tax-deferred contributions by the employer to a qualified defined contribution retirement plan; 2) annual change in actuarial value of a qualified defined benefit plan; 3) value of health benefits provided by the employer, or paid by the employee with pre-tax dollars, that aren't included in reportable compensation; 4) tax-deferred contributions by the employer and employee to a funded nonqualified defined contribution plan; and 5) annual change in actuarial value of a nonqualified defined benefit plan.

### **1.2 ExecuComp compensation definitions**

The salary component of ExecuComp refers to the base salary earned during the fiscal year, and the bonus component refers to the value of the bonus earned during the fiscal year.

Stock awards are the value of stock-related awards (e.g. restricted stock, restricted stock units, common stock equivalent units, etc.) that do not have option-like features. Option awards are the value of option-related awards (e.g., options, stock appreciation rights, and other instruments with option-like features). For both stock and option award, valuation is based upon the value of shares that vested during the year as detailed in FAS123R. The amount is the cost recorded by the organization on its income statement as well as any amounts that were capitalized on the balance sheet for the fiscal year. This discloses the cost that was charged to the organization for the year, as distinct from the grant date fair value of the award. Non-equity incentive plan compensation is the value of amounts earned during the year pursuant to non-equity incentive plans. The amount is disclosed in the year that the performance criteria was satisfied and the compensation was earned.

Organizations must also report the change in pension value and nonqualified deferred compensation earnings is composed of above market or preferential earnings from deferred compensation plans, and aggregate increase in actual value of defined benefit and actual pension plans during the year. All other compensation includes perquisites and other personal benefits, termination or change-in-control payments, contributions to defined contribution plans (e.g., 401K plans), life insurance premiums, gross-ups and other tax reimbursements, discounted share purchases, etc.

## **2. Sample construction**

Our main analysis focuses on non-profit U.S. hospitals in both 2010 and 2015, and for 2015 only private non-profit institutions of higher education and publicly traded organizations in the S&P 1500 Index (excluding publicly traded hospitals). Our estimation sample for non-profit and publicly traded organizations is derived from GuideStar and ExecuComp, respectively.

### **2.1 Hospital data**

Our non-profit hospital data came from GuideStar, and the for-profit hospital sample is from ExecuComp. Non-profit hospitals are associated with three categories from the National Taxonomy of Exempt Entities (NTEE): hospitals and primary medical care facilities (E20), community health systems (E21), and hospital (general) (E22). Since our study focuses on short-term acute care hospitals, we did not use E24 (hospital (specialty)) for our study. Given the breadth of E20 and E21, it is possible that some observations in the raw GuideStar data are not short-term acute care hospitals; we discuss this in the exclusion criteria section. Our initial hospital data set contained information on 66,107 employees (37,034 in 2010 and 29,073 in 2015) across 7,687 hospitals (4,056 in 2010 and 3,631 in 2015).

#### **2.1.1. Hospital crosswalk (GuideStar and AHA data)**

To link the GuideStar data with the AHA data (which has hospital CCNs), we created a crosswalk matching employer identification number (EIN) reported on Form 990 in GuideStar to CCN in AHA. Based on methodology described on the Center to Advance Community Health & Equity (CACHE) website, we matched GuideStar organizations to AHA systems, AHA hospitals, or CMS POS facilities.

We matched GuideStar and AHA data using two methods. First, we matched based on organizations' latitude and longitude within two decimal places.<sup>1</sup> We extracted hospital addresses from GuideStar and standardized them using Google's geocoding application programming interface (API); we also used latitude and longitude provided in the AHA data. Second, we matched hospitals based on exact city and state and similar hospital name, second name, or DBA matches.<sup>2</sup> Similar names were defined as those having a similarity score >85%, and matches with a similarity score between 70-85% were checked manually. Similarity scores were generated using the Excel Fuzzy Lookup add-in, which is based on a fuzzy matching algorithm.<sup>3</sup> For example, "Bayfront Medical Center Inc St Petersburg FL" and "Bayfront Medical Center Saint Petersburg FL" had an 86% similarity score. We chose this matching algorithm because it was better able to match strings with similar keywords but different lengths, where distance formulas would not have performed as well.

Potential matches were subjected to multiple checks. First, we manually checked cases where the matching methods described above yielded multiple initial matches (i.e., a single EIN matching to multiple CCNs). Under these criteria, we checked 741 potential matches, dropped or corrected 477, and retained all valid matches. Second, we checked potential latitude/longitude matches that were farther than 0.25 miles apart. We calculated great-circle distances using the spherical law of cosines. We ultimately dropped 59 of 110 matches greater than 0.25 miles apart. Third, we checked potential matches that had dissimilar names or different cities or states. Valid explanations for such cases include hospitals that report under multiple names or file in different cities from where they operate. We checked 643 of these matches and dropped 277.

In cases where a potential match combination varied between 2010 and 2015, the match or non-match was verified, dropped, or updated with the other year's verified match. 292 potential matches and non-matches were checked, and 264 were dropped or updated. Finally, to manually confirm a match, we first searched for the GuideStar hospital name and address using Google and verified that the organization was a hospital or a hospital parent. We then confirmed the match if the two observations were the same hospital under multiple names, were located at the same building on Google maps, or included a system member and a parent filing in the same city and state. After completing all checks, 3,694 CCNs were identified for 3,742 EINs (for a match rate of 98.7%). In the process of verifying matches, 338 non-hospitals were identified and dropped from the sample.

## **2.2 Higher education and publicly traded organization data**

Our private non-profit higher education data come from GuideStar, and our publicly traded organization sample includes all non-hospital observations from ExecuComp. Institutions of higher education are associated with three NTEE categories: higher ed institutions (B40),

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<sup>1</sup>A threshold of two decimal places was used since AHA-provided latitude and longitudes varied at the third decimal place for hospitals over time. Distances between potential matches greater than 0.25 miles were checked manually.

<sup>2</sup>Our method diverges slightly from CACHE's since CACHE uses exact name matches while we allow for similar name matches.

<sup>3</sup>Fuzzy Lookup and Fuzzy Grouping use a custom, domain-independent distance function that takes into account the edit distance (for example, "hits" is distance 2 from "bit"), the number of tokens, token order, and relative frequencies. As a result, Fuzzy Lookup and Fuzzy Grouping achieve much finer discrimination than full-text searches because they capture a more detailed structure of the data. See <https://www.microsoft.com/en-us/download/details.aspx?id=15011> and <https://msdn.microsoft.com/en-us/library/ms345128.aspx>.

undergraduate college (4-year) (B42), and university or technological (B43).<sup>4</sup> We stratified publicly traded organizations into “non-hospital healthcare industry” (NAICS codes 325411-325414, 334510, 334516, 334517, 334519, 339112-339115, 423450, 424210, 446110, 524114, 621111, 621340, 621491-621493, 621498, 621511, 621610, 621999, and 623110) and “other.” Non-hospital healthcare industry organizations include pharmaceutical, diagnostics, and medical equipment manufacturing, healthcare product distributors, health and medical insurance, and healthcare services. Publicly traded hospitals were identified in ExecuComp using North American Industrial Classification System (NAICS) codes<sup>5</sup> and excluded from the main analysis. Our initial data contained information on 12,489 employees across 1,616 institutions of higher education and 23,015 employees across 5,924 publicly traded non-hospital organizations (964 of which were classified as “non-hospital healthcare”).

### **2.3 Duplicate reporting in GuideStar**

Some organizations (which are uniquely identified by employer identification number (EIN)) filed an identical Form 990 under multiple NTEE codes. E20 and B40 represent the broadest categories for hospitals and higher education, respectively. Some hospitals therefore filed under both E20 and E21 or E22, and similarly institutions filed under both B40 and B42 or B43. Additionally, some hospitals that are part of a community health system filed under both E21 and E22. We dropped duplicate observations for 868 organizations that filed multiple times. We kept information on the most specific NTEE code available. For example, if an organization filed under both E20 and E22, we kept the observation with NTEE code E22. If an organization filed as both E21 and E22, we kept the observation with NTEE code E21 since we planned to do a sensitivity analysis that excluded community health systems from our sample.

### **2.4 Exclusion criteria**

We excluded employee observations from our sample (both GuideStar and ExecuComp) if the organization is not based in the U.S. (4,380 organizations, including 65 hospitals, which corresponded to 14,782 employees) or if the employee is missing compensation information (2,716 employees).

Second, we excluded observations that are foundations since in most cases they do not operate a hospital.<sup>6</sup> We applied this exclusion criteria to higher education institutions and publicly traded organizations for consistency. Although there is not a foundation identifier in GuideStar or ExecuComp, we classified any organization with the keywords “foundation,” “fndn,” or “fdn” in the organization name as a foundation. We then checked whether any hospitals that were flagged as foundations uniquely matched to hospital or system observations in the American Hospital Association (AHA) Annual Survey Database.<sup>7</sup> If there was a unique match, we kept the observation in our final sample (this occurred in 193 cases; examples included Cleveland Clinic Foundation and Mercy Foundation Inc). Using these criteria, 392

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<sup>4</sup>Compensation data for public universities is available from the Chronicle of Higher Education, but since revenue is not reported, public universities are not part of our estimation sample.

<sup>5</sup>General medical and surgical hospitals (622110), psychiatric and substance abuse hospitals (622210), and specialty non-psychiatric hospitals (622310).

<sup>6</sup>Although we could not find any specific statistics that indicate the rarity of (joint) hospital-foundations within the hospital industry, they are only allowed in certain states and do not appear frequently in the AHA data.

<sup>7</sup>We matched GuideStar observations to the AHA Annual Survey Database based on methodology described on the Center to Advance Community Health & Equity’s (CACHE) website (“Community Benefit Insight”, 2017). Full details of the matching method are available upon request.

hospitals, 93 institutions of higher education, and 0 publicly traded organizations were classified as foundations, corresponding to 2,034 employees.

Finally, some organizations in the GuideStar data are categorized as hospitals according to NTEE code, but are not hospitals. Therefore, we excluded any observations in our data for hospital organizations that do not deliver short-term acute care or have a missing value for Centers for Medicare (CMS) Certification Number (CCN).<sup>8</sup> 1,669 hospitals (corresponding to 16,078 employees) in Guidestar were missing CCN, and therefore excluded from our hospital sample.

For three organization-year observations, one person who was the CEO had compensation information that spanned multiple personnel entries. For these observations we flagged a single personnel entry and summed relevant compensation values. After correcting compensation that was entered across multiple personnel lines, removing organizations that filed under multiple NTEE codes and applying our exclusion criteria, our data consisted of 64,478 employees across 6,901 organizations.

## **2.5 CEO sample identification**

The initial exclusion criteria (except for missing compensation) was based on organization-level characteristics. Since both ExecuComp and GuideStar contain data on both CEOs and other employees, we needed to identify the CEO at each organization to construct our final sample.<sup>9</sup>

ExecuComp includes a flag for whether each employee is the CEO (“ceoam”), which made identifying the CEO for organizations in ExecuComp straightforward. In GuideStar, each organization has a corresponding personnel file with all information reported on Form 990, which includes employee names, titles, and compensation. Since GuideStar does not include a flag for CEO, we used keywords in titles for CEO identification.

We flagged observations as CEOs using an initial set of keywords and their variants (e.g., “ceo,” “chief executive,” “president”). After applying these keywords, 64% of our GuideStar organization-year observations had exactly one CEO flagged; 8% had no CEO flagged and 28% had two or more CEOs flagged.

We then applied another set of keywords to reclassify individuals who were not the CEO but had been flagged based on our initial keywords (e.g., “chief finance,” “chief operating,” “secretary to the ceo”). We also applied another set of keywords to capture possible CEOs from organizations that had zero flagged (e.g., “exec. director”). After applying our additional keywords, 81% of our GuideStar organization-year observations had exactly one CEO flagged; 9% had no CEO flagged and 10% had two or more CEOs flagged.<sup>10</sup>

We then manually checked the personnel data for the organization-year observations with either zero or two or more flagged CEOs to identify the hospital-specific CEO for those

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<sup>8</sup>Similarly, for institutions of higher education, we excluded 63 organizations from the GuideStar data that were not universities or four-year colleges. Keywords to identify these observations included “publish,” “senate,” “preparatory,” and “auxil.”

<sup>9</sup>For institutions of higher education, we identified the President as the employee analogous to a CEO at hospitals/publicly traded organizations. For institutions that did not have a President, we selected the Chancellor, if reported, as the CEO equivalent. If a Chancellor was not reported, the Provost, if reported, was treated as the CEO.

<sup>10</sup>Some of the organizations that previously had multiple CEOs flagged shifted to the group with no CEOs flagged, and some from the group with zero CEOs shifted to the groups with one or more CEOs.

observations. 6% of organizations did not report any CEO (or in the case of institutions of higher education a president/provost/chancellor), and these organizations were excluded from the sample. In the case of organization-year observations with zero CEOs flagged but exactly one employee with the title of chief administrative officer, administrator, or director, we flagged that employee as the CEO.

For organization-year observations with a hospital chain / health system CEO and a regional or hospital-specific CEO, we created separate flags for the hospital-specific and system CEO. The system CEO was identified either by title (e.g., “system ceo”) or by comparing title keywords across potential CEOs with the organization name. For example, consider an organization called “sample healthcare organization” with three employees flagged as potential CEOs. One has the title “ceo, east”, the second has the title “ceo” (or “ceo sample healthcare organization”), and the third has the title “ceo, Michigan hospital.” In this example, the employee with the title “ceo, Michigan hospital” was selected as the hospital-specific CEO for the main analysis and the employee with the title “ceo sample healthcare organization, ” was flagged as the system CEO.

After manually checking and reclassifying observations, 87% of the organization-year observations had exactly one CEO flagged; 7% had no CEO flagged and 5% had two or more CEOs flagged. After dropping organizations with zero CEOs and all employees that were not flagged as a CEO, our data consisted of 7,057 CEOs (some of which spanned across multiple organizations) across 6,591 organizations (with approximately 5% of organizations having two or more CEOs flagged).

## **2.6 Collapsing across individuals**

Approximately 73% of for-profit and non-profit non-federal hospitals in the 2015 AHA data belong to either a hospital chain or system. This feature of the hospital industry is apparent in our GuideStar data given that within a year since some individuals are reported as the CEO across multiple hospitals (this was not an issue for institutions of higher education, publicly traded organizations, or for-profit hospitals). Individuals that span across multiple non-profit hospital organizations account for approximately 8% of the data. Our final sample kept one observation for each unique person-year regardless of the number of hospitals they were affiliated with. Since Form 990 information is self-reported by each organization, sometimes names were reported inconsistently across organizations (e.g., one hospital reports first and last name and another hospital also includes the middle initial). To identify individuals with variations on their name being reported across hospital, we removed all titles and middle initials from the employee name field and then matched employees on first and last name only.<sup>11</sup>

For individuals that had observations across multiple hospitals, we kept their highest reported compensation (82% of individuals that spanned across hospitals had the same pay reported across hospitals). We summed the revenue across hospitals to capture the total size of all affiliated organizations for the CEO. Once we collapsed across individuals, our data consisted of 6,257 CEOs across 5,950 organizations.

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<sup>11</sup>Some names were reported in the form initial, name, last name (e.g., A. John Miller). In these cases, we left the person’s name as reported.

## 2.7 Hospitals with Two or More CEOs

The organization-year observations with two or more CEOs flagged after checking each organization manually and reclassifying system and hospital CEOs (approximately 3% of the sample) were explained by the following situations: 1) the presence of partial-year CEOs; 2) multiple individuals with identical titles; and 3) multiple individuals with similar titles (e.g., CEO and CEO/Pres). We refer to CEOs from the first situation as “partial CEOs” and CEOs from the latter two situations as “multiple CEOs.”

Organization-year observations were flagged as having a partial CEOs if one or more of the employees’ title contained dates of employment or the keywords “resigned,” “part yr,” “terminated,” or “retired.” We also flagged partial-year CEOs in the case where the text field was truncated (i.e., no date was reported due to truncation), but the title included keywords such as “eff. from,” “to,” “beg.,” “through,” or “end.” Approximately 26% of organization-year observations with two or more CEOs had partial CEOs. The remaining organization-year observations were flagged as having multiple CEOs.

Rather than keep two or more CEOs per organization in our sample for some organizations, we combined their compensation data into a single observation. Once we combined compensation information for multiple and partial CEOs and dropped indeterminant observations (i.e., cases in which we could not determine whether a CEO was the system or regional CEO versus a hospital CEO), our final CEO sample size was 5,870, which matched the number of organizations. For our main analysis, we summed compensation across partial CEOs (within an organization-year) to obtain total compensation; in the case of multiple CEOs we used the maximum compensation across CEOs. We ran sensitivity analyses that used the following values for compensation regardless of whether the observation was a multiple or partial CEO: sum compensation across all flagged CEOs, average compensation across all flagged CEOs, maximum compensation across flagged CEOs, and minimum compensation across flagged CEOs. Results are similar across different compensation construction methods, and are available upon request.

## 3. Additional analysis details

Our compensation predictions are generated by regressing log compensation on log revenues. To determine differences across industry (year, state), we include a set of industry (year, state) indicator variables and interact those indicators with log revenues. The set of indicators allows the mean predicted compensation to vary across industry (year, state) independent of revenues. The interaction terms allow for the relationship between revenues and compensation to vary across industry (year, state). Our regression is represented mathematically by the following:

$$\ln(\text{compensation}_i) = x_i' \beta + \epsilon_i \quad (1)$$

where  $i$  indexes CEOs,  $x_i$  is a vector of covariates including log revenue and the set of indicator variables and interactions of interest (industry, year, or state depending on the analysis), and  $\epsilon_i$  is an unobserved error term. Although our model uses log compensation as the dependent variable, we are interested in predictions for compensation on the raw scale (i.e.,  $E(\text{compensation}|x_i)$ ). Taking the expected value and transforming both sides of (1), we have

$$E(\text{compensation}_i|x_i) = \exp(x_i' \beta) \exp(\epsilon_i) \quad (2)$$

In order to obtain unbiased estimates for predicted compensation ( $E(\text{compensation}|x_i)$ ), we assume heterogeneity by group and calculate Duan's smearing factor:

$$D_{smear}^j = \frac{1}{N} \sum \exp(\hat{\epsilon}_i) \quad (3)$$

where  $j$  indexes group and  $\hat{\epsilon}_i = \ln(\text{compensation}_i) - x_i' \hat{\beta}$  (Duan, 1983). The raw scale predictions for group  $j$  are then given by:

$$E(\text{compensation}_i|x_i)^j = \exp(x_i' \hat{\beta}) D_{smear}^j \quad (4)$$

#### 4. Additional results

Appendix Appendix Table 1-3 present the regression results that correspond to the analysis presented in the manuscript.

**Appendix Table 1. Compensation regression results (industry type)**

	Coefficient	95% Confidence Interval
Log Revenue	0.237*	0.197, 0.277
Institutions of Higher Education	-0.534*	-0.740, -0.328
Publicly Traded (Health Industry)	1.266*	0.717, 1.816
Publicly Traded (Other)	0.416*	0.163, 0.859
Higher Education*Log Revenue	0.050*	0.006, 0.095
Publicly Traded (Health Industry)*Log Revenue	0.064	-0.012, 0.139
Publicly Traded (Other)*Log Revenue	0.140*	0.081, 0.199
Constant	-1.772*	-1.961, -1.583

Notes: Dependent variable:  $\ln(\text{compensation})$ . Hospital CEOs are the reference group. Significance: \* $p < 0.05$

**Appendix Table 2. Hospital compensation regression results (2010 vs. 2015)**

	Coefficient	95% Confidence Interval
Log Revenue	0.347*	0.324, 0.371
Year=2015	0.608*	0.386, 0.829
2015*Log Revenue	-0.110*	-0.157, -0.064
Constant	-2.380*	-2.495, -2.265

Notes: Dependent variable:  $\ln(\text{compensation})$ . Hospital CEOs in 2010 are the reference group. Significance: \* $p < 0.05$

**Appendix Table 3. Hospital compensation regression results (U.S.states)**

	Coefficient	95% Confidence Interval
Log Revenue	0.203*	0.125, 0.280
Alabama	-0.456	-3.497, 2.585
Arkansas	-0.310	-1.425, 0.804
Arizona	-0.774*	-1.526, -0.0227



	Coefficient	95% Confidence Interval
California	0.0414	-0.774, 0.857
Colorado	0.0764	-0.603, 0.756
Connecticut	1.231*	0.0984, 2.364
District of Columbia	1.708*	1.126, 2.291
Delaware	-0.627	-1.451, 0.197
Florida	-0.119	-0.720, 0.481
Georgia	-0.722	-1.591, 0.147
Hawaii	0.676*	0.0411, 1.310
Iowa	0.313	-0.720, 1.345
Idaho	0.224	-0.533, 0.980
Illinois	0.700	-0.134, 1.534
Indiana	-0.0977	-0.772, 0.577
Kansas	-0.261	-0.763, 0.240
Kentucky	-0.0919	-0.803, 0.619
Louisiana	0.00303	-1.035, 1.041
Massachusetts	0.379	-0.597, 1.356
Maryland	-0.291	-0.681, 0.0978
Maine	0.0143	-0.718, 0.747
Michigan	0.0926	-0.555, 0.740
Minnesota	-0.542	-1.122, 0.0375
Missouri	0.514	-0.808, 1.835
Mississippi	-0.150	-1.474, 1.174
Montana	-0.0459	-0.523, 0.431
North Carolina	0.209	-0.904, 1.321
North Dakota	-0.730*	-1.435, -0.0253
Nebraska	0.551	-0.293, 1.395
New Hampshire	0.0899	-1.509, 1.689
New Jersey	1.877*	1.319, 2.435
New Mexico	-0.279	-0.607, 0.0496
Nevada	-0.186	-1.530, 1.158
New York	1.077*	0.396, 1.758
Ohio	1.215*	0.663, 1.767
Oklahoma	-1.676*	-2.286, -1.065
Oregon	-0.0589	-0.438, 0.320
Pennsylvania	0.974*	0.245, 1.704
Rhode Island	1.720	-0.351, 3.790
South Carolina	-0.667	-1.386, 0.0530
South Dakota	-1.071*	-1.541, -0.600
Tennessee	0.543	-0.877, 1.963
Texas	0.749*	0.0697, 1.429
Utah	-0.0629	-1.925, 1.799
Virginia	0.0569	-1.263, 1.376
Vermont	-0.512	-2.054, 1.030
Washington	-0.788	-1.616, 0.0404

	Coefficient	95% Confidence Interval
Wisconsin	0.715	-0.173, 1.603
West Virginia	-0.291	-1.114, 0.532
Wyoming	-1.286*	-1.577, -0.996
Alabama*Log Revenue	0.168	-0.435, 0.771
Arkansas*Log Revenue	0.0983	-0.161, 0.358
Arizona*Log Revenue	0.238*	0.0674, 0.408
California*Log Revenue	0.112	-0.0531, 0.277
Colorado*Log Revenue	0.102	-0.0539, 0.257
Connecticut*Log Revenue	-0.0222	-0.228, 0.184
District of Columbia*Log Revenue	-0.120*	-0.227, -0.0136
Delaware*Log Revenue	0.215*	0.0795, 0.351
Florida*Log Revenue	0.155*	0.0337, 0.276
Georgia*Log Revenue	0.255*	0.0967, 0.413
Hawaii*Log Revenue	-0.129	-0.360, 0.102
Iowa*Log Revenue	0.0121	-0.214, 0.238
Idaho*Log Revenue	0.0170	-0.156, 0.190
Illinois*Log Revenue	-0.0303	-0.210, 0.149
Indiana*Log Revenue	0.134	-0.0152, 0.283
Kansas*Log Revenue	0.104	-0.0279, 0.236
Kentucky*Log Revenue	0.0742	-0.116, 0.264
Louisiana*Log Revenue	0.117	-0.0744, 0.308
Massachusetts*Log Revenue	0.0713	-0.107, 0.249
Maryland*Log Revenue	0.182*	0.0891, 0.275
Maine*Log Revenue	0.0354	-0.119, 0.190
Michigan*Log Revenue	0.0943	-0.0469, 0.236
Minnesota*Log Revenue	0.195*	0.0694, 0.321
Missouri*Log Revenue	-0.0182	-0.289, 0.253
Mississippi*Log Revenue	0.142	-0.0795, 0.363
Montana*Log Revenue	0.0347	-0.0795, 0.149
North Carolina*Log Revenue	0.00780	-0.215, 0.231
North Dakota*Log Revenue	0.218*	0.0708, 0.365
Nebraska*Log Revenue	-0.110	-0.329, 0.108
New Hampshire*Log Revenue	0.0734	-0.245, 0.392
New Jersey*Log Revenue	-0.155*	-0.263, -0.0468
New Mexico*Log Revenue	0.146*	0.0500, 0.243
Nevada*Log Revenue	0.0805	-0.186, 0.347
New York*Log Revenue	-0.0697	-0.225, 0.0856
Ohio*Log Revenue	-0.0952	-0.217, 0.0269
Oklahoma*Log Revenue	0.487*	0.325, 0.649
Oregon*Log Revenue	0.0758	-0.0326, 0.184
Pennsylvania*Log Revenue	-0.0888	-0.248, 0.0701
Rhode Island*Log Revenue	-0.166	-0.549, 0.216
South Carolina*Log Revenue	0.221*	0.0549, 0.388
South Dakota*Log Revenue	0.326*	0.185, 0.467

	Coefficient	95% Confidence Interval
Tennessee*Log Revenue	0.0740	-0.236, 0.384
Texas*Log Revenue	-0.0491	-0.189, 0.0905
Utah*Log Revenue	-0.0280	-0.564, 0.508
Virginia*Log Revenue	0.132	-0.114, 0.379
Vermont*Log Revenue	0.174	-0.133, 0.481
Washington*Log Revenue	0.243*	0.0800, 0.406
Wisconsin*Log Revenue	-0.0355	-0.253, 0.182
West Virginia*Log Revenue	0.0995	-0.106, 0.305
Wyoming*Log Revenue	0.354*	0.276, 0.432
Constant	-2.104*	-2.395, -1.814

Notes: Dependent variable: ln(compensation). Hospital CEOs in Alaska are the reference group. Significance: \*p<0.05

## 5. Sensitivity Analysis

### 5.1 Include Hospital Systems

We conducted a sensitivity analysis that included non-profit system CEOs that were flagged during the CEO sample identification process. Since non-profit system CEOs oversee multiple hospitals, we expect that compensation and revenue are larger for system CEOs compared with hospital-specific CEOs. The summary statistics presented in Appendix Tables 4-5 confirm these expectations. Regression results were consistent with the main analyses, and are available upon request.

### 5.2 Include Publicly Traded Hospital Chains

Although our main study focuses on non-profit hospitals, the ExecuComp data includes observations for for-profit hospital chains. Publicly traded hospitals were identified in ExecuComp using North American Industrial Classification System (NAICS) codes. We included general medical and surgical hospitals (622110), psychiatric and substance abuse hospitals (622210), and specialty non-psychiatric hospitals (622310). These chains represent 386 hospitals in 2010, and 478 in 2015, approximately 62% and 75% of all for profit hospitals in each year, respectively. Similar to non-profit hospital system CEOs, we expected compensation and revenue to be higher for publicly traded hospital chain CEOs compared with non-profit hospital-specific CEOs. Summary statistics confirm this expectation and are presented in Appendix Tables 4-5. Regression results were consistent with the main analyses, and are available upon request.

### 5.3 Exclude Community Health Systems (NTEE code: E21)

We conducted a sensitivity analysis that excluded community health systems (NTEE code: E21) from the sample. Since community health systems are larger organizations, we expected both compensation and revenue to be lower on average for non-health systems. The summary statistics presented in Appendix Table 4 confirm that both average compensation and revenues are lower once we exclude hospital systems. Regression results were consistent with the main analyses, and are available upon request.

## Appendix Table 4. Summary Statistics, U.S. Hospital CEOs 2010

	Hospital CEO type	Mean	Std. Dev.	Min	Max	Median
Compensation	Non-profit hospital-specific (n=1,866)	638,814	672,816	55,589	6,523,436	431,133
	Publicly traded (n=8)	12,715,120	13,793,770	591,638	41,514,540	9,784,693
	Non-profit system CEO (n=13)	1,429,156	1,716,842	225,790	5,802,708	674,438
	Community health system– E21 (n=152)	774,191	743,589	73,786	4,597,353	569,593
Revenue (in millions)	Non-profit hospital-specific (n=1866)	269.9	587.7	0	13,959.1	111.7
	Publicly traded (n=8)	8,730	11,068.1	69.9	33,352.4	4,788.0
	Non-profit system (n=13)	865.7	1,229.4	7.2	4,637.4	453.8
	Community health system– E21 (n=152)	267.6	1,017.3	0	12,216.7	68.1

**Appendix Table 5. Summary Statistics, U.S. Hospital CEOs 2015**

	Hospital CEO type	Mean	Std. Dev.	Min	Max	Median
Compensation	Non-profit hospital-specific (n=1,317)	688,526	731,800	51,650	8,043,977	463,776
	Publicly traded (n=9)	10,294,180	7,386,559	593,252	20,477,030	10,438,770
	Non-profit system CEO (n=12)	1,296,238	648,661	146,288	2,322,751	1,388,664
	Community health system– E21 (n=193)	829,027	699,984	57,255	3,739,609	662,017
Revenue (in millions)	Non-profit hospital-specific (n=1,317)	277.1	746.9	0	15,799.8	77.6
	Publicly traded (n=9)	10,983.1	12,934.1	91.8	39,678	5,214.3
	Non-profit system (n=12)	454.5	427.7	0	1,217.9	442.4
	Community health system– E21 (n=193)	309.2	1,293.1	0	15,799.8	25.6

## References

- Center to Advance Community Health & Equity. (2017). *Community Benefit Insight*. Retrieved from <http://www.communitybenefitinsight.org/>
- Duan, N. (1983). "Smearing Estimate: A Non-Parametric Retransformation Method." *Journal of the American Statistical Association*, 78(383):605-610.