Performance Metrics and Nonprofit Hospital CEO Compensation

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Abstract

Past research has documented that increases in profits and health system size play larger roles than quality metrics in explaining increases in nonprofit hospital CEO pay between 2012 and 2019. We update this analysis to test whether hospital quality measures influence CEO pay in the post pandemic period. We investigate correlates of rising nonprofit hospital CEO pay between 2015 and 2022 by merging compensation data from IRS 990 forms with hospital financial data from the National Academy for State Health Policy Hospital Cost Tool. Large CEO pay increases may be justified for nonprofit hospitals if they are linked to higher quality care. To investigate the role of quality in compensation, we use the Overall Hospital Quality Star ratings from the Center for Medicaid and Medicare Services (CMS), as well as various measures of mortality and readmission rates for patients presenting with various conditions. A Oaxaca decomposition allows us to separate the relative importance of differences in covariates, like profits, size, and quality between 2015 and 2022, and differences in the generosity of CEO pay packages for each covariate. We find that nonprofit CEOs in 2022 were rewarded more generously than CEOs in 2015 for leading larger systems and earning higher profits. Additionally, we find that most of the rise in CEO compensation is accounted for by increase in bonus compensation. We use two-part models to estimate the associations between profit, bed size, and bonus compensation. Our findings show that bonus compensation is strongly associated with profit and system size, rather than quality of care. To further examine how these relationships vary across the wage distribution, we employ a quantile regression strategy. We find that the association between profit and bonus compensation is larger for CEOs at the higher end of the wage distribution. Our results indicate that CEOs are incentivized to generate higher profits and expand system size, rather than to deliver more charity care or improve care quality.

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Introduction

Executive compensation at nonprofit hospitals and health systems had risen in recent decades. Nonprofit status for hospitals was originally intended to create mission driven institutions focused on community health and the delivery of significant community benefits. Today, many nonprofit hospitals perform similar charity care to for-profit organization and regularly award seven figure salaries to their CEOs (Jenkins, Short, & Ho , 2024) (Zare, Eisenberg, & Anderson, 2021). This has raised questions in the media about how these compensation packages are determined and whether they align with the charitable mission of nonprofit institutions.

As healthcare costs continue to rise and public trust erodes, nonprofit hospital CEO pay has come under increasing media scrutiny. Significant attention has been given to compensation packages of healthcare executives of for-profit health systems, insurance companies, pharmacy benefit managers, and pharmaceutical companies. (Boden, 2024) (Garber, 2024). While these salaries are often shockingly large, nonprofit hospitals are unique in their obligations to generate significant community benefit to remain exempt from most federal and state taxes. This status carries with it an implicit fiduciary duty to the public interest, prioritizing community heath over excessive financial performance and executive compensation. Operating profits, cash reserves, and healthy revenue streams are an important part of the financial health of a hospital. However, prioritizing operating profits, cash reserves, and executive compensation in excess of what is required to maintain the charitable missions of the hospital doesn't align with their obligation for favorable tax treatment. The obligations of nonprofit hospital CEOs are significantly different than those employed at for-profit organizations, but research suggests they receive similar compensation packages and are rewarded for similar behavior. (Santerre & Thomas, 1993)

CEOs compensation consists of base salary, bonus compensation, and other forms of benefits like retirement savings and deferred compensation. Publicly traded for-profit health systems release annual proxy statements that include detailed information on how the base salary is created, as well as requirements and incentives associated with bonus compensation. Previous work finds that for-profit organizations employ stronger performance-based incentives than nonprofits (Roomkin & Weisbrod, 1999).

While these large for-profit systems are very transparent about the methods used to determine bonus compensation, it is unclear how boards of nonprofits determine compensation packages of CEOs. Hospital boards, who in most cases are responsible for setting CEO compensation may lack financial or governance expertise to effectively design a compensation that holds CEOs accountable to the hospital's charitable mission (Cardinaels, 2009). Additionally, they may operate without transparency or be influenced by a large share of insiders on the board (Brickley, Van Horn, & Weding, 2010).

Nonprofit hospital CEOs receive much higher compensation than nonprofit CEOs in other sectors (Economic Research Institute, 2021). Across all nonprofit sectors in the United States CEO pay typically ranges between $100,000 and $200,000. However, when limiting that sample only to hospital CEOs, the average compensation is more than $600,000. As healthcare executive salaries are rapidly rising, other healthcare salaries are lagging behind. In 2005 the wage gap of CEO to registered nurses was 23:1, by 2015 the gap had risen to 44:1 (Du, Rascoe, & Randall, 2018).

CEOs respond to incentives set before them by the board (Mirrlees, 1976). Previous research finds CEO pay increases are associated with healthcare consolidation and financial incentives (Hancock, 2013) (Jenkins, Short, & Ho , 2024) (Kramer & Santerre, 2010). Our paper

investigates whether CEOs are being incentivized to provide greater quality care and community benefits or instead to raise profits and drive mergers and acquisitions.

Background and Literature

The rise in CEO pay at nonprofit hospitals is well documented (Jenkins, Short, & Ho , 2024) (Joynt, Le, Orav, & Jha, 2014) (Mulligan, Chosky, Ishitani, & Romley, 2022). Concern over executive compensation at nonprofits is not a recent phenomenon. Boards have been concerned over rising executive compensation since the early 1990's (Nemes, 1992). Throughout the 1990's hospital boards evolved to allow for greater CEO collaboration (Alexander, Weiner, & Bogue, 2001).

Board governance structures play a significant role in determining CEO compensation packages (Brickley, Van Horn, & Weding, 2010) (Kane, Clark, & Rivenson, 2009) In many cases, CEOs themselves may even be members of the board at nonprofit hospitals and health systems. There is strong evidence that CEO board membership has a positive association with hospital prices, operating margins, and CEO compensation (Brickley, Van Horn, & Weding, 2010). Nonprofit hospital CEO pay is greater when there are insiders on the board and the excess pay gap is even larger when they operate in markets without competition from for-profit hospitals.

Cardenalis et al 2009 finds that CEO pay increases when boards are less experienced and more highly paid (Cardinaels, 2009). Boards are uniquely positioned to influence the behavior and direction of organizations by ensuring that the incentives provided to the CEO are aligned with their charitable mission. Browner et al 2014 reports that instead of rewarding CEOs for increasing the quality of care, hospital boards reward prestige and patient experience over

clinical outcomes (Browner, 2014). Joynt et al 2014 also finds that CEOs are rewarded for patient satisfaction, but not quality or community benefit (Joynt, Le, Orav, & Jha, 2014) Other research comes to similar conclusions that CEOs are rewarded for financial performance and patient satisfaction rather than charity care or quality. (Jenkins, Short, & Ho , 2024) (Mulligan, Chosky, Ishitani, & Romley, 2022)

Research on board dynamics from other sectors find similar problems. Using a panel dataset from 1920 to 2011, Graham et al 2020 find that board independence increases at CEO turnover and falls with CEO tenure. They find this decline to be stronger following superior financial performance. Additionally, they find a positive market reaction occurring when a CEO dies in office, suggesting that powerful CEOs becoming entrenched (making company decisions that benefit personal goals). (Graham, Kim, & Leary, 2020).

The literature on board dynamics and CEO pay suggests that boards play a critical role in determining the incentives that shape CEO decisions and priorities. Our paper adds to this literature by investigating the determinants of the rise in nonprofit hospital CEO compensation, with an emphasis on how boards incentivize CEOs via annual bonuses.

Data and Methods

The National Academy of State Health Policy (NASHP) Hospital Cost Tool (HCT) provides data on hospital financial characteristics that are derived from Medicare Cost Reports. (National Academy For State Health Policy, 2025) This data includes total charity care costs, operating profit, and hospital bed size. The operating profit variable we use is defined as net patient revenue minus hospital operating costs. Hospital operating costs are those directly related

to patient care. Costs outside the scope of patient care are not included; thus, operating profit is larger than net income. Net income measures hospital income and includes costs not related to patient care. Charity care spending is defined as total spending on charity care. The main quality measure we use in our sample is the hospital star rating. Each hospital within a system receives a star rating. To account for this, we weight each hospital's star rating by bed size to aggregate the rating at the system level. Our final sample includes both hospitals and health systems, and we expect the association between wage and hospital size will be nonlinear. To adjust for this nonlinear relationship, we categorize hospital bed size into five categories: <100 beds, 100-299 beds, 200-699 beds, 700-1999 beds, and over 2000 beds.

We match the data using hospital name or address with data from Candid, which summarizes IRS Form 990 filings reporting CEO compensation (Candid, 2025). When we were unable to match by name or address, hospitals were manually matched to IRS Form 990 filings. IRS Form 990s include data on base compensation, bonus compensation, and other forms of compensation such as health benefits, deferred compensation, and other retirement benefits. The compensation reported includes all compensation from related organizations.

We also use the American Hospital Association (AHA) annual survey data for system classification and teaching status (American Hospital Association, 2025). We apply the AHA system classifications and collapse the data at the system level when applicable. Our final sample includes both single, independent hospitals and health systems.

Classifying the CEO

Hospitals are required to report all current officers, directors, and trustees. In addition, they must report executive compensation information for up to 20 current employees who meet

the IRS definition of a key employee (one with certain responsibilities and reportable compensation greater than $150,000 from the organization or related organizations) as well as their five highest-compensated employees who are not officers, directors, trustees, or key employees.

To identify the CEO, we select the highest paid executive with a title indicating they are likely the CEO. We define a CEO title as any executive whose title includes the strings, “CEO”, “CHIEF EXECUTIVE”, “PRESIDENT”, or “CHAIRMAN”. Form 990s are completed at the E-IN level. Many systems complete these forms using multiple E-INs. Thus, for large systems, there may be more than one person with a title that containing “CEO” or “President”. In these cases, we use the highest-paid executive flagged as a potential leader. For 78 observations, no one’s title met our inclusion criteria; for these cases, we use the salary of the highest-paid executive as a proxy for CEO pay.

The IRS requires compensation from “related organizations” to be reported on Form 990. This requirement often results in system-level executives being reported on Form 990s of multiple hospitals within the system. Since the total compensation reported should include all related organizations, we keep the observation with the highest reported total compensation.

To analyze changes in the incentive structures faced by CEOs, we use a Oaxaca decomposition. Oaxaca decompositions are commonly used by labor economists studying wage discrimination to separate the wage difference attributable to differences in group characteristics (i.e education for men versus women) from differences due to coefficient effects (i.e discrimination) (Oaxaca, 1973). We use the same method to estimate the rise in CEO pay attributable to changes in hospital characteristics (i.e bed size, operating profit, hospital quality)

and the rise attributable to differences in the incentive structures CEOs face. The Oaxaca decomposition is explained in detail in Appendix Exhibit 1.

Much of the increase in CEO pay is driven by the rise in bonus compensation. However, only about 65% of CEOs in our sample receive an annual bonus. We use two-part models, to estimate the association between various hospital characteristics and CEO pay. First, we estimate each covariate's association with the probability of receiving a bonus using logistic regression. Next, by using a generalized linear model to estimate the association between covariates and the size of the bonus. Finally, we present the average marginal effects. Standard errors for the average marginal effects are calculated using the delta method. We also re-estimate our two-part models of bonus compensation stratifying the sample to estimate the association of our covariates and bonuses for independent hospitals and systems separately.

Our sample includes both small independent hospital and large health systems. Thus, we hypothesize that the association between financial performance and hospital size may vary across the wage distribution. To account for this skewness, we use quantile regression, which allows us to estimate the association of CEO pay with our covariates at different points along the wage distribution.

Results

From 2015 to 2022 total compensation rose by 21.7%, from $1.18 million to $1.44 million. During the same period, bonus compensation rose from $169,349 to $378,117, a 123.3% increase. In 2015, the average operating profit in our sample (defined as net patient revenue minus hospital operating costs) was $119.6 million, and charity care spending was $13 million.

By 2022, operating profit and charity care grew to $125.3 million and $16.7 million, respectively. There was substantial hospital consolidation during this period. The average number of beds at hospitals and health systems in our sample grew by 20%, from 402 to 486. While average bed size increased, the share of beds at teaching hospitals remained approximately 8% in both years.

Table 1 - Descriptive Statistics

	2015	***2022***	***% Increase***
Total Compensation	1,180,570	1,436,762	21.7%
Bonus Compensation	169,349	378,117	123.3%
Profit ($Millions)	119.55	125.27	5.2%
Charity Care Spending ($ Millions)	13.03	16.67	28%
Hospital Star Rating	3.08	3.17	2.9%
Bed Size	402	486	20.1%
% of Teaching Hospitals	8.1%	8.2%	1.2%

Table.1 presents the descriptive statistics of our sample in 2015 and 2022. Total compensation includes base salary, bonus compensation, and other compensation types such as deferred compensation, health benefits, and other. Percent of teaching hospital is defined as the percentage of beds for each hospital or health system that are located at a teaching hospital. We use the AHA's classification of teaching hospital.

Oaxaca Decomposition

Figure 1 presents the results of the Oaxaca decomposition of log wages on hospital or health system-level covariates. The total difference in log wages from 2015 to 2022 was 0.282. Of this, 0.1018 log points of salary increase accrued to the base case CEO; a CEO whose hospital earned zero profit, spent nothing on charity care, had a star rating of zero, and had less than 100 beds at a nonteaching facility. The left side of the figure shows the portion of the

difference explained by changes in regression coefficients each year. Most of these unexplained "coefficient effects" are small. Notable contributions to the wage gap included increases in the reward for leading a health system with 700-1999 beds and over 2000 beds, which increased log wages by 0.0046 and 0.014 log points, respectively. Similarly, increases in the reward for charity care and hospital star ratings were associated with an increase in log wages of 0.0129 and 0.0076, respectively.

The right side of Figure 1 presents the difference in wages attributable to difference in hospital characteristics. By far, the largest contributors to the increase in log wages are the rise in CEOs leading hospital with over 2000 beds, and those with 700-1999 beds. Increases in these two covariates from 2015 to 2022 are associated with increases of 0.0846 and 0.0625 in log wages, respectively. Increases in the number of CEOs leading hospital with 300-699 beds also contributed to a 0.012 rise in log wages. Higher profits made a marginal contribution, accounting for a 0.0166 rise in log wages. Increases in teaching status, charity care spending, and hospital star ratings did not meaningfully contribute to the rise in log wages.

As additional sensitivity analyses, we include a system indicator in the Oaxaca decomposition and present the results in the appendix.

Figure 1

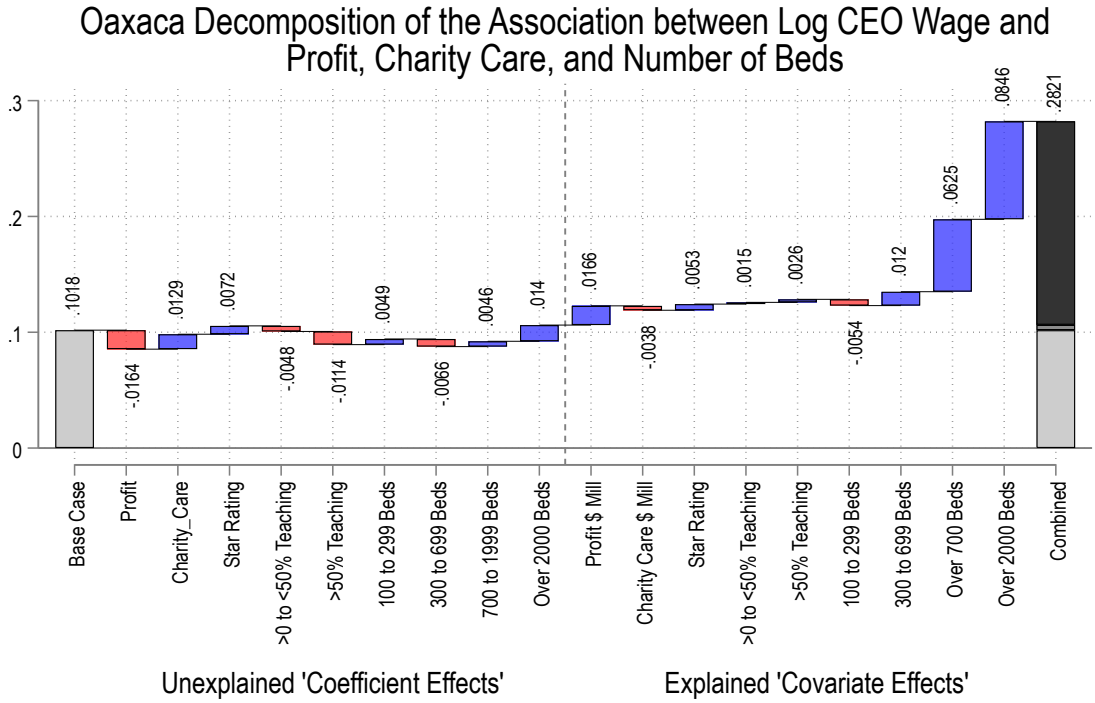


Figure 1 presents the results of the Oaxaca Decomposition. Oaxaca decomposition is often used to analyze the difference in gender-based wage discrimination. Here we employ the same methodology to analyze the change in log wages for CEOs from 2015 and 2022, to see if the rise in wages was due to changes in the rewards for various hospital characteristics, or changes to the hospital characteristics themselves. The left most bar on the graph presents the increase in compensation that accrued to the base case CEO. The base case CEO was a CEO whose hospital earned zero profit, spent zero on charity care, had a star rating of zero, and had less than 100 beds at a nonteaching facility. The left side of the figure represents the unexplained "coefficient effects" which present change in log wages associated with an increase in the reward for each of our covariates. The right side of the figure presents the explained "covariate effects", which present the change in log wages associated with increases among the covariates from 2015 to 2022. The column on the right side of the graph presents the compensation increase that accrued to a base case hospital, the total unexplained "coefficient effects, and the total explained "covariate effects".

Table 2: Two Part Model of Bonus Compensation

	2015			*2022*		
	Logit	**GLM**	**AME**	**Logit**	**GLM**	**AME**
Profit	0.003**	808.46***	633.32***	-0.0001	1,893.3***	1,536.5***
Charity Care	0.002	-2,497.92***	-1,559***	0.004	-1,745.8	-1,217.2
Star Rating	0.442***	7,525.47	20,167.4	0.398***	-6,620.4	12,280
>0%&<50% Teaching	1.11	120,086.8	116,630*	0.673	-23,050	11,169
>50% Teaching	0.29	20,948.19	23,839	-0.075	138,588	109,311
100-299 Beds	0.786***	88,819.2*	84,889**	0.626*	60,235	76,799
300-699 Beds	1.26***	122,857.3*	123,387***	1.47***	115,431	159,287
700-1,999 Beds	0.558	220,111.6***	162,567***	1.34*	237,074	252,345*
Over 2,000 Beds	-0.118	402,627.1***	258,189**	1.64	1,091,973***	960,541***

Table 2 presents the results of two-part models estimating the association between profit, charity care, hospital star rating, teaching status and bed size on bonus compensation. The first column for each year presents the results of the logit model, which estimates the increase in probability that a CEO will receive a bonus corresponding to a one unit change in the independent variable. The second columns represent the results of the generalized linear model. This model includes only CEOs who received a bonus and estimates the association bonus compensation with each of our covariates. The third column for each year presents the average marginal effects of each covariate. Standard errors for the average marginal effects are calculated using the Delta method. ***,**,* represent 99.9, 99, and 95 percent confidence levels.

Table 2 presents the results of our analysis of bonus compensation using two-part models for CEOs in 2015 and 2022. The average marginal effects allow us to interpret the associations in dollar terms. Overall, we find that operating profits and bed size are associated with significantly higher annual bonuses in both 2015 and 2022, with a greater magnitude in 2022.

We interpret the results of the logit regression as an approximation of the association between a one-unit increase in each covariate and the probability of receiving an annual bonus. Each additional million dollars in profit increases the probability of receiving a bonus by approximately 0.3% ($p<0.05$). The results from the GLM regression, using the sample of CEOs who earned an annual bonus, estimate an $808 increase in bonus compensation ($p<0.001$) per million-dollar increase in operating profit. In 2015, the average operating profit in our sample

was $120 million. By 2022, the association of bonus compensation and profit was even larger. While the logit model suggests that earning additional operating profit does significantly increase not increase the odds of receiving a bonus, among CEOs who did receive a bonus, each additional million dollars in operating profit was associated with a $1,893 ($p<0.001$) increase in bonus compensation. Overall, the average marginal effect of each million-dollar increase in operating profit on bonus compensation grew from $633 in 2015 to $1,537 in 2022.

Charity care spending did not significantly increase the odds of receiving a bonus. However, in 2015, each additional million dollars in charity care spending was associated with a $2,498 ($p<0.001$) decrease in CEO bonus compensation. By 2022, the estimated association of charity care spending on bonus compensation was no longer statistically significant.

In 2015, a one-unit increase in hospital star rating was associated with a 44% increase in the odds of receiving a bonus ($p<0.001$). By 2022, a one-unit change increase was associated with a 40% ($p<0.001$) increase in the odds of receiving a bonus. However, among CEOs who received an annual bonus, a higher star rating was not associated with a larger bonus amount.

Our categorical variables for hospital size show large and statistically significant associations with bonus compensation. In 2015, leading a hospital or health system with 100-299 beds or 300-699 beds was associated with being 78% ($p<0.001$) or 126% ($p<0.001$) more likely, respectively, to receive a bonus compared to CEOs at hospitals with less than 100 beds. In 2022, CEOs at these hospitals were 63% ($p<0.05$) and 147% more likely to receive a bonus. Among CEOs who received a bonus, those in the 100-299 bed group received $88,819 more than the reference group, and those in the 300-699 category received $122,857 more.

For larger hospital systems, the estimated associations were even larger. In 2015, the average marginal effect on bonus compensation for CEOs leading a system with 700-1999 beds was $162,567 ($p<0.001$), while those with over 2000 beds earned $258,189 ($p<0.001$) more than the reference group. By 2022, the average marginal effect of bed size on bonus compensation had increased to $252,345 for CEOs in the 700-1999 beds category and $960,541 for those in the largest bed size category.

As a sensitivity analysis, we run the two-part models using OLS of log bonus compensation. The results are similar and can be found in the appendix.

Our results suggest the primary drivers of annual bonuses for CEOs are operating profits and hospital bed size. To further examine this relationship, Figure 2 plots CEO bonus compensation alongside hospital bed size and operating profits for the top 10% of earners in each year. Consistent with our earlier regression analysis, we observe that hospitals with more beds and higher profits tend to award larger bonuses. In 2022, the CEO for CommonSpirit Health (the largest nonprofit hospital in our smaple) earned an annual bonus of over $15 million dollars. That same year, seven CEOs received bonuses exceeding $5 million. Of these, five of them operating health systems with over 4000 beds: Providence, UPMC, Banner Health, CommonSpirit Health, and Advocate Aurora Health. In contrast, in 2015, no nonprofit health systems in our sample award annual bonuses over $5 million.

Figure 2



Figure 2 presents a scatter plot of CEO pay with the number of beds on the y axis, and operating profit in millions on the x-axis. The size and color of the marker represents size of the annual bonus. The data was truncated at 10,000 beds and $2 billion dollars in operating profit for presentation. Values on the upper and right edges of the chart have been changed to fit the graph.

Quantile Regression

Table 2 and Figure 3 suggest that the largest and most profitable hospitals are the ones awarding the highest bonuses. Recall that our sample includes both independent hospitals and large health systems. To investigate whether the association between profit, bed size, and CEO compensation is stronger for CEOs higher in the wage distribution, we use quantile regression to estimate the association between profit and bed size on the 10^{th},20^{th}, 40^{th}, 50^{th}, 60^{th}, 70^{th}, 80^{th}, and 90^{th} percentiles of bonus compensation in each year.

In 2015, at the 10th percentile of the wage distribution, the association of profit and bonus compensation is small and not statistically significant. By the 30th percentile, we estimate a significant association between bonuses and operating profit (in $millions) of approximately $250 dollars. This relationship increases steadily along the wage distribution, reaching nearly $1,500 per additional million dollars in profit at the 90th percentile.

Notably, until the 70th percentile, the OLS estimate exceeds the quantile regression estimates. Although this difference is only statistically different for the first three quantiles, it suggests that the largest hospitals award CEOs more generously for each additional million dollars in operating profit than hospitals whose CEOs fall lower in the wage distribution.

In 2022, we estimate that association between bonus compensation and operating profit is not statistically significant until the 50th percentile of the wage distribution, where each additional million dollars in operating profit is associated with a $550 dollar increase in bonus compensation for each additional million dollars in operating profit. At the 90th percentile, this association rises to nearly $2,500 per additional million dollars in profit. In 2022, the quantile regression results were significantly lower than the OLS results up to the 70th percentile, suggesting that the association of profit and bonus compensation is primarily driven by high earners at large hospitals.

Figure 3

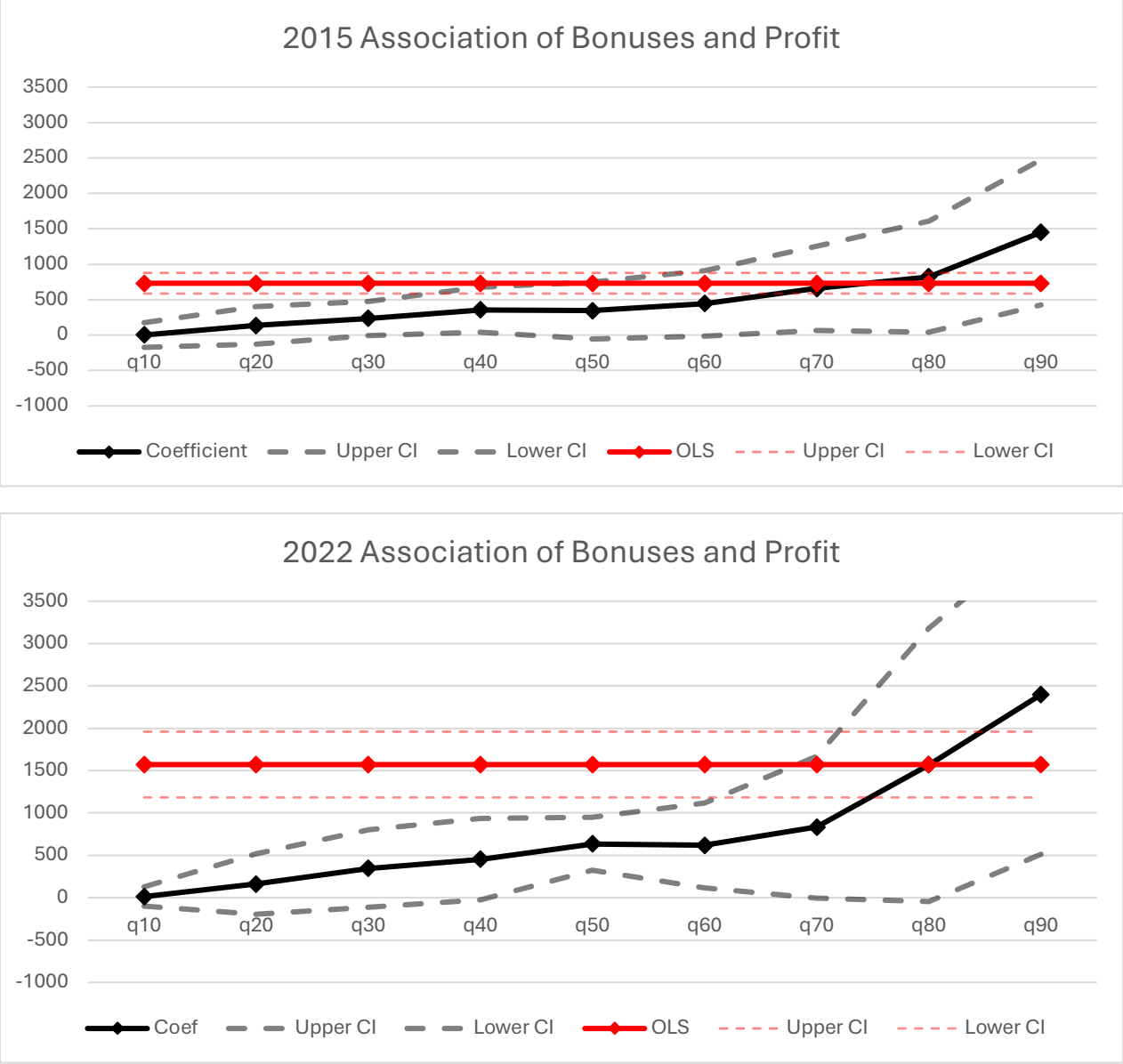


Figure 3 present the results of quantile regression where we regress profit, charity care spending, teaching status, bed size, and hospital star rating on bonus compensation. The association between bonus compensation and profit is presented above. The black line in the figure above presents the point estimates of quantile regression and each quantile. The gray dotted lines present 95 percent confidence intervals. The red line is the OLS estimation of the same specification for reference, along with the 95 percent confidence interval.

Discussion

CEO compensation at large nonprofit hospitals has increased rapidly from 2015 to 2022. These pay increases are concentrated among hospitals that have grown larger, consolidated, and become increasingly profitable. From 2015 to 2022, this trend has intensified, with some nonprofit hospital CEOs are now earning salaries that exceed those in for-profit organizations. Much of the rise in CEO pay at the top if the wage distribution is explained by boards awarding larger annual bonuses, which are associated with increases to system size and operating profits.

Boards that determine annual bonuses do not appear to reward CEOs for charity care spending or providing higher-quality care. The literature suggests that board composition plays a significant role in CEO compensation, and well performing boards are able to influence the organizational decision making effectively. (Cardinaels, 2009) (Browner, 2014). We interpret this to mean that CEOs are responding to the incentives set before them, and therefore boards are well-equipped to shape the strategic and charitable missions of nonprofit hospitals through the implicit or explicit incentive structures for executive compensation. Boards that continue to reward CEOs primarily for higher profits and larger health systems are not encouraging CEOs to fulfill their obligations to the communities they serve.

Policy Implication

Our results suggest that increasing public oversight of annual bonuses for nonprofit CEOs could help realign the priorities nonprofit health systems to better serve their communities, as originally intended. While publicly traded for-profit health systems provide detailed disclosures on how top executives are compensated, information on the determinants of nonprofit executive compensation is generally not publicly available. More transparency in the incentive structures facing nonprofit CEOs could improve public trust, and more importantly, encourage these

leaders to guide their hospitals and health systems toward delivering more community benefits and higher-quality care.

Limitations

Our study has notable limitations. First, although we were able to properly identify over 90% of the CEOs in our sample, in cases where no executive held a title meeting our inclusion criterion, we designated the highest-paid executive as the CEO. In most hospitals and health systems, the CEO was the highest paid executive.

Next, many hospitals had to be matched manually, and approximately 10% of the nonprofit hospitals in the HCT were not able to be matched. As a result, when collapsing the data to the system level, we may slightly undercount profits, bed size, and charity care. Similarly, if a hospital was unable to be matched, its quality data were not included in the weighted star rating variable, even though the hospital was under the leadership of the CEO in our sample.

Finally, while our analysis provides useful descriptive insights that contribute to the literature on CEO compensation at nonprofit hospitals, out estimates are not casual and should not be interpreted as such. The relationship of wages and profit is highly endogenous, and we estimate the associations of compensation on hospital characteristics rather than casual effects. Addressing the endogeneity of wage and profit in this context is an important area for future work.

Conclusion

Our study finds that nonprofit hospital CEOs are rewarded not for delivering high-quality care or increasing charity care spending, but rather for growing hospital size and generating higher operating profits. The rise in CEO compensation, much of which is explained by increases

in annual bonuses, is much more pronounced at that top of the wage distribution. Large nonprofit health systems are awarding significantly larger bonuses to their CEOs in 2022 than they were in 2015, with these bonuses are increasingly linked to higher profits and consolidation. Our findings suggest that nonprofit CEO compensation packages are misaligned with the charitable mission of nonprofit hospitals and may not justify their favorable tax treatment.

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Appendix Exhibit 1, Oaxaca Decomposition Method

The Oaxaca decomposition has long been used by labor economists to break down differences in mean wages between two groups (e.g. males vs. females) into the portion that is attributable to differences in pay for people with the same characteristics in each group, versus differences in pay resulting from differences in the characteristics of people in these two groups. We can apply the decomposition to break differences in CEO compensation that occurred due to changes in the means of covariates in our analysis and changes in the coefficients.

Begin by estimating regressions of allowed amounts on patient characteristics for the years 2015 and 2022.

$$CEO_{15} = \alpha_0 + \alpha_1 Prof_{15} + \alpha_2 CC_{15} + \propto_3 Teaching_{15} + \propto_4 Bed_{15} + \propto_5 Star_{15} + \varepsilon_{15}$$

$$CEO_{22} = \beta_0 + \beta_1 Prof_{22} + \beta_2 CC_{22} + \beta_3 Teaching_{22} + \beta_4 Bed_{22} + \beta_5 Star_{22} + \varepsilon_{22}$$

Subscripts on variables refer to the year 2015 or 2022.

CEO= Log of CEO compensation in 2022 dollars.

α is used to represent coefficients in 2015 equation

β is used to represent coefficients in 2022 equation

Prof =Profit in millions of 2022 dollars

CC= Charity care cost in millions of 2022 dollars.

Teaching is a vector of categorical variables for teaching status

Bed is a vector of categorical variables for levels of bed size

The overall change in the mean log CEO compensation between 2015 and 2022 can be expressed as the following where $\boldsymbol{X}$ is a vector of all covariates and α_{15} and β_{22} are vectors of the coefficients in each year.

$$\overline{CEO}_{22} - \overline{CEO}_{15} = (\beta_0 - a_0) + \beta_{22}\bar{X}_{22} + \beta_{22}\bar{X}_{15} - \beta_{22}\bar{X}_{15} - a_{15}\bar{X}_{12\backslash 5}$$

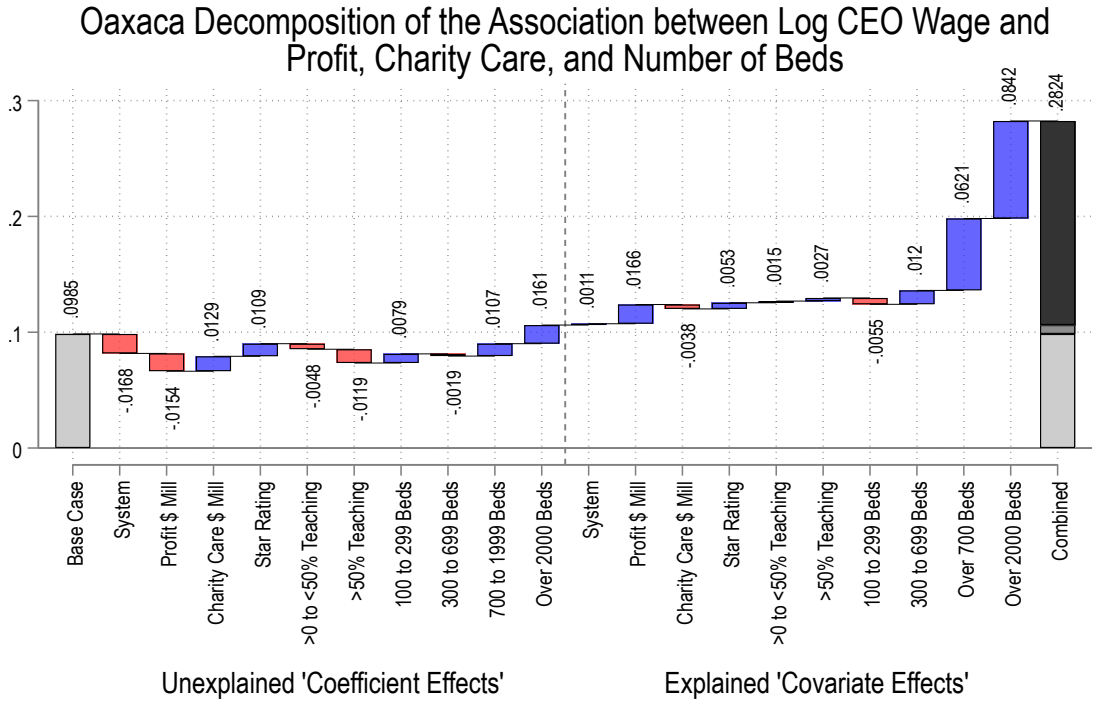
Because the average value of residuals in a linear regression is zero, the difference in log CEO compensation between 2022 and 2015 includes only coefficients and means of explanatory

variables. These coefficients and mean explanatory variables can be arranged to yield the following, which breaks down the change in log CEO compensation from 2022 to 2015 into three components, the amount of the change explained by (1) the difference in the intercepts, (2) changes in the coefficients, and (3) changes in the means of the covariates:

$$\overline{CEO}_{22} - \overline{CEO}_{15} = \underbrace{(\beta_0 - a_0)}_{Changes\ in\ Intercept} + \underbrace{\bar{X}_{15}\,(\beta_{22} - a_{15})}_{Changes\ in\ Coefficients} + \underbrace{(\bar{X}_{22} - \bar{X}_{15})\beta_{22}}_{Change\ in\ Covariates}$$

These three components are mutually exclusive and exhaustive, comprising the entire difference of mean log CEO compensation.

Appendix Exhibit 2



Appendix Exhibit 2 presents the same Oaxaca decomposition as our main specification in Figure 1 but includes a system indicator.

Appendix Exhibit 3

	Single Hospital				System			
	2015		2022		2015		2022	
	AME	SE	AME	SE	AME	SE	AME	SE
Profit ($mill)	602.64***	204.7008	540.61*	227.2522*	431.8162**	162.1073	711.6543	464.777
Charity Care ($ mill)	1525.85	998.3277	3540.48	1682.801	-578.8455	813.8076	415.108	1808.065
Hospital Star Rating	23072.04	13124.29	31752.63	12845.74	-36900.83	62991.48	101923.1	153843.6
>0% and <50% Teaching	N/A	N/A	N/A	N/A	105131.5	90160.68	531137.7	451291.4
>50% Teaching	71508.46	41303.02	22374.72	81233.6	-31104.43	91032.46	595800.2	427013.5
100-299 Beds	132989***	27587.63	162553***	38804.14	-401285.9	527315.4	573921.8	1681530
300-699 Beds	118892***	46286.19	235375***	51156	1733.879	486609.9	849988.8	1694576
700-1999 Beds	159799***	61450.02	201207.1	.	171822.3	482392.7	1423956	1752578
Over 2000 Beds	N/A	N/A	N/A	N/A	205289	491947.2	2167124	1907345

Appendix Exhibit 3 presents the average marginal effects as estimated by two-part models. Here we stratify by whether an observation is a system or an independent hospital. The first part of the two-part model is a logit model, and for the second part we use log regression. Standard errors are bootstrapped, and average marginal effects are estimated using the duan smearing method.

Appendix Exhibit 4

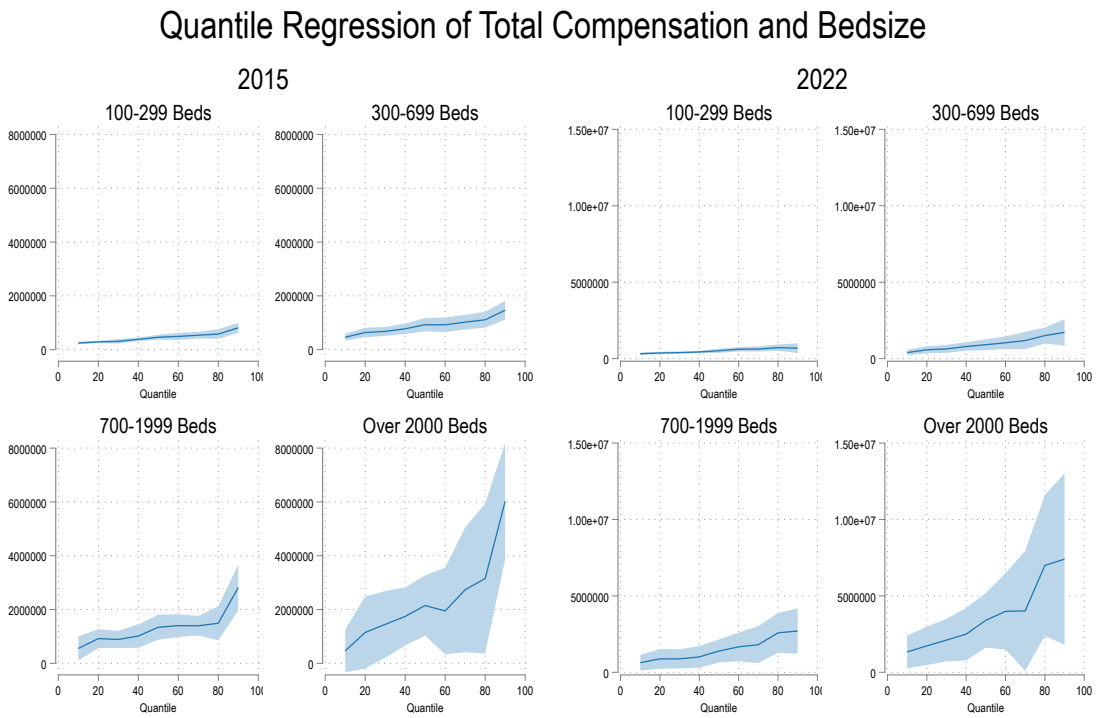


Figure 4 presents the results of quantile regression where we regress profit, charity care spending, teaching status, bed size, and hospital star rating on bonus compensation. The blue line in the figure above presents the point estimates of quantile regression and each quantile for each bed size categorical variable. The gray dotted lines present 95 percent confidence intervals. In 2015, the association of leading a hospital with over 2000 beds and bonus compensation grows from approximately $0.7 million at the lowest quantile, to $6 million at the highest quantile. Similarly, in 2022 the association between bonus compensation and the largest bed size category increase form approximately $1.7 million at the lowest quantile of the wage distribution, to nearly $7.5 million at the highest quantile.