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Wage Dispersion and Financial Performance of Nonprofit Hospitals

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This Special Issue of the *Journal of Health Care Finance* honors Dr. Louis C. Gapenski for his contributions to the fields of health care finance, public health finance and health administration. In his writing, teaching and mentoring, he served as a role model for all of us.

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Abstract

The strategic use of wage dispersion in compensation policy can be a double-edged sword for health care organizations, with a performance-enhancing potential that increases under certain conditions (i.e., tournament and risk-taking incentives) but decreases under other conditions (i.e., perceived unfairness and inequality and lack of team cohesiveness). We use the data set of employee wage and financial statements of 48 nonprofit hospitals in Maryland to examine the relationship between employee wage dispersion and hospital financial performance. We find a positive effect of wage dispersion among low-skilled health care workers (e.g., lab assistant and phlebotomist) on hospital profitability and a negative effect of wage dispersion among high-skilled health care workers (e.g., nurse manager and occupational therapist) on profitability. The staff size in each skill category tends to offset the original impact of wage dispersion on the hospital's financial outcomes.

Keywords: pay inequality, worker incentive, non-for-profit hospital, profit margin

"Hospitals that choose to offer higher wages are able to attract more nurses, leading to more adequate staffing and improved patient care."

— Institute for Women's Policy Research, 2006

"Pay continues to rise for CEOs of major hospitals."

— The Boston Globe, August 18, 2015

Introduction

Human resource management practices in general, and organizational compensation policies in particular, are important business decisions with significant social, economic and financial implications for both for-profit and nonprofit organizations (e.g., Guthrie, 2007; Shaw, 2014; Downes and Choi, 2014; Lam and White, 1998; Ben-Ner, Ren and Paulson, 2011; Van Puyvelde, et al., 2012). At the present time, there exists considerable disagreement in the literature over what represents "best practice" in compensation strategy. While this paper will review and discuss some results in the previous literature related to the study of compensation policy and organizational performance, it is intended to focus on the pay effects in not-for-profit hospitals.

The compensation policy in any organization, for-profit or nonprofit, can be characterized by its pay structures including the number of pay levels, the differences between each level, and the rate at which workers can progress through each level. It can be broadly characterized as pay dispersion or distribution. One the one hand, compensation policies with wide pay dispersion encourage employees exerting maximum efforts (e.g., tournament and risk-taking incentives), and on the other hand, the perceived unfairness can offset the original impact of pay dispersion on business outcomes (e.g., lack of team cohesiveness). Prior research examining the joint impact of tournament incentive and perceived unfairness on organizational performance has mainly relied on data of for-profit firms. Since nonprofit organizations have different missions, goals and operating styles than corporations in the for-profit sector, exact duplication of the private sector pay policy would not be appropriate in these institutions, especially the not-for-profit hospitals in the context of this study. The internal monitoring mechanism (the interests of shareholders) [1] and the external monitoring mechanism (the market for corporate control) [2] do not exist for not-for-profit organizations; therefore, the problem of shirking in team production can be more prevalent in these organizations. In addition, the levels of pay are generally low in nonprofit institutions, and there are several explanations in the literature (Ben-Ner et al., 2011). The organizational missions do not allow nonprofit institutions to distribute "surplus" earnings to employees as part of an incentives scheme; however, they can still do so through other forms of excess payments or fringe benefits (Hansmann, 1980). Although such strategic benefits would not be considered performance-based, they may attract certain types of employees, for example, those who are concerned about compensation both on the job and after disability, unemployment, and retirement (Van Der Hoek, 1989), or those who are simply willing to accept low compensation to perform

[1] Acording to Alchian and Demsetz (1972), the principal (the owner or the shareholders), as residual claimant and direct monitor of agents' performance, can reduce shirking in teams.

[2] Similar argument can be made that if it is more difficult for new would-be monitors to discipline the agent by takeover threats, shirking in teams will be prevalent.

socially desirable activities (Frank, 1996). It has been documented in the literature that nonprofit employees have higher job satisfaction, despite lower wages, than their for-profit counterparts (Borzaga and Torti,a 2006; Light, 2002). Preston (1989) suggests that in these circumstances, not-for-profit employers should rely on the use of wage dispersion as part of their organizational strategies to motivate employees to increase performance.[3]

It is clear that a better understanding of how the two (dis)incentive factors (competitive tournament vs. lack of cohesiveness) interact is crucial to the creation of an efficient compensation policy in a not-for-profit hospital. Specifically in this study, we examine a data set of wage dispersion and financial statements of 48 Maryland hospitals in the period of 2008 to 2010 with detailed classification of job functions and hourly pay rate. We therefore analyze the interrelation between the pay dispersion of different job/skill categories of the health care workforce[4] and hospital financial outcomes.[5] Our findings provide insights of the relative importance of fairness considerations resulting from pay inequality compared to the tournament incentive effects.

Related Literature

The publication of Lazear and Rosen (1981) and Akerlof and Yellen (1988, 1990) highlights the importance of understanding the effects of wage distribution on worker behavior with one arguing that a more differentiated wage structure encourages workers to exert maximum effort by awarding large prizes to the most productive ones (i.e., tournament incentive),[6] and the other suggesting that wage compression or pay equity improves labor cohesiveness among workers (i.e., income fairness).[7] Since that time, researchers have presented a variety of evidence that wage dispersion does (dis)incentivize employees; however, there is no consensus on the precise impact and which theory dominates the other (e.g., Lazear, 2000; Abrevaya, 2002; Becker and Huselid, 1992; Bull et al., 1987; Ehrenberg and Bognanno, 1990; Main et al., 1993; Camerer and Thaler, 1995; Cowherd and Levine, 1992). Using a laboratory experiment, Charness and Kuhn (2007) find no evidence that coworkers' wages actually affect workers' effort and productivity.

Although the argument that wage policies affect worker behavior is not new (Simon, 1957), the literature examining the connection between pay dispersion and business outcomes is indeed recent, and little research has been done to investigate such incentive effects in health care organizations. Lallemand, Plasman and Rycx (2004) and Heyman (2005) find a positive link between the dispersion of wage levels and firm performance in Belgium and Sweden respectively. Winter-Ebmer and Zweimüller (1999) attribute their finding of an inversely U-shaped interrelation between wage dispersion and the level of wages for white collar employees in Austrian firms to

[3] See Leete (2000) for more discussions on the worker motivation in the non-profit sector. The author uses the US Census dataset, rather than a linked employer-employee dataset like the one used in this paper, to compare wage equality between the non-profit sector and the for-profit sector.
[4] Osterman (2006) finds that workers with higher skills were paid higher and improved productivity.
[5] Groshen and Krueger (1990) examine the BLS data on 300 hospitals in 1985 and find a phenomenon of wage-equality within hospitals that if a hospital paid relatively high wage to one occupation, it was likely to pay high wages to workers in other occupations as well.
[6] See Rosen (1986) for a comprehensive review of the literature on tournament incentives.
[7] For other papers on fairness and equity considerations, see Fehr and Schmidt (1999), Levine (1991), and Milgrom and Roberts (1990).

the fact that higher wage level in a firm simply reflects better firm performance. Similar evidence is reported in Franck and Nüesch (2011) using German data and Yang and Klaas (2011) using Korean data. Bloom (1999) shows that the level of wage dispersion among major league baseball team members is negatively related to several measures of individual and team performance. Pfeffer and Langton (1993) find decreasing research productivity and collaboration among college and university faculty with increasing wage dispersion.

There are some studies focused on the wage distribution among senior managers, for example, Eriksson (1999) reveals a positive relationship between the pay spread among executives and firm profitability in Denmark, whereas Leonard (1990) and O'Reilly, Main and Crystal (1988) do not find such results among managers in U.S. firms. Beaumont and Harris (2003) use the ratio of non-manual and manual labor costs per employee as a proxy for wage dispersion to overcome the lack of individual wage information, and report a positive association between worker wage dispersion and value-added per employee in UK manufacturers. To some extent, our measure of wage dispersion using the average value of hourly wage ranges at the job function level is technically better than the rough measure used in Beaumont and Harris (2003) because there are 65 job functions within each hospital in our sample, and we believe the distribution mean of this sample size for each hospital is statistically meaningful.

In addition to the aforementioned cross-sectional evidence, there are other papers studying aggregate time-series data. Hibbs and Locking (2000) find more positive than negative effects of wage dispersion on firms' real added-value in Swedish. Bingley and Eriksson (2001) examine the skewness of intra-firm wage distribution, and suggest a U-shaped relation with firm productivity in Denmark. Interestingly, Grund and Westergaard-Nielsen (2008) show a negative association between the dispersion of wage growth and firm performance in Denmark; however, it is mainly driven by white-collar rather than blue-collar workers. The authors argue that the dispersion of wage growth is more revealing than the dispersion of wage levels for purposes of comparing wage dispersion's positive incentive effects with its adverse morale effects. Directly related to this paper, Brown et al. (2003) analyze a sample of three hundreds of short-stay acute care hospitals, both for-profit and not-for-profit, in California by grouping jobs into nine categories (physicians, non-physician medical practitioners, managers and supervisors, technicians and specialists, registered nurses, licensed vocational nurses, aides and orderlies, clerical and other administrative staff, and environmental and food service staff) and conclude that hospital financial performance (ROA) is not related to the degree of hierarchy in hospital pay structure.

Besides pay dispersion, an organizational compensation policy can also be characterized by its pay structures, such as the number of wage levels in the structure, the number of employees in each level (and of course, the rate at which employees can progress the pay hierarchy), and the size of the pay differentials between each level in the structure. The levels and differentials in wage structures represent the complex nature of the interdependent relationship between worker skills, incentives, and productivity. When the demand for labor is heterogeneous, that is, different jobs require different levels of skill, pay dispersion may create different incentives for employees in these skill categories, and in turn, affect hospital outcomes differently. Until now, there is no definite evidence in the literature to show that high- and low-skilled workers response to wage dispersion differently due to their different perceptions to tournament incentives and pay unfairness.

The brief review of prior literature shows that empirical evidence is mixed in regards to whether wage dispersion improves firm productivity, and this can be attributed to the fact that different individuals and teams response to monetary incentives differently. The effects of pay dispersion on productivity depends on the kind of relevant production function transforming effort to production and the group of employees who are more sensitive to monetary incentives. Therefore, we can not simply to aggregate the effort of individual workers to the productivity of the firm (Adams 2006). In the context of nonprofit hospitals, monetary rewards might be the primary, if not only, motivation for low-pay or low-skilled health care workers, such as lab assistant and phlebotomist; this type of production function implies that the observed productivity effect is expected to be increasing in the overall effort and the argument of tournament incentives suggests a positive link between the wage dispersion and hospital performance. However, for high-pay or high-skilled workers, such as nurse manager and occupational therapist, their motivation might well be based on a high degree of work-group cohesion or the welfare of their patients rather than monetary incentives; as a result, they might exert effort that can be equally detrimental to productivity, such as complaining to co-workers, ingratiation, duplicity, verbal aggression, bad-mouthing, or even antagonistic exit. This argument of unfairness perception suggests a negative link between the wage dispersion and hospital performance. Therefore, it is an empirical question to determine which effect dominates in practice.

Given that the majority of prior research only studies the economic consequences of pay dispersion using data of for-profit companies, this article seeks to present a contribution by focusing on nonprofit hospitals that usually do not offer employees other incentive schemes such as bonus, profit sharing or stock options, and on health care workers with different skill levels.[8] Such an update in the literature is critical to understanding how pay dispersion at different skill levels affect the overall productivity of health care organizations that disproportionally rely on intrinsically motivated employees.[9]

Data

Our primary data source is the Wage and Salary Survey Results, a self-reported administrative data set that contains information on maximum, minimum and average wages for 64 categories of hospital workers. This unique panel data originates from the Maryland Health Services Cost Review Commission (HSCRC) and is used for disclosure and served as the basis for the Labor Market Adjustor to account for differences in area wage levels. All hospitals in Maryland are required to report their worker wage distribution information to the Health Services Cost Review Commission (HSCRC). An important feature of this data set is that it is possible to associate

[8] Li (2013) develops a theoretical model to study job mobility and wage dispersion under asymmetric information and suggests that the wage distribution becomes more spread out (greater pay inequality) if technological change is skill-biased and favors general skills over firm-specific skills. One of the empirical implications of this model is a positive association between firm productivity and wage dispersion among workers with general (non-firm-specific) skills. If firm financial performance represents skill-biased technological change and the group of low-skill employees represents general-skill workers, our results provide empirical evidence supporting this theory; however, the causality is in the opposite direction by assumption.

[9] Osterman (2006) examines a sample of blue-collar manufacturing workers and reveals a positive relation between skill level and wage level, and attributes that relationship to productivity gains.

workers' wages with their employers. The wage dispersion data cover all employees who are not medical doctors and managing executives in 48 hospitals during the fiscal year of 2008-2010, and include a detailed breakdown of 64 job functions.[10] Employers are defined by their hospital identification number, and job categories are defined by their job function code.

Our dependent variable is the accounting profitability of the hospital and we use two different ratios to measure profitability. The first one is the operating margin, the ratio of the operating income divided by the total revenue, and the second one is the net profit margin, defined as the net income divided by the total revenue. It is often argued that net profit margin is not a reliable profitability measure because net income (the numerator in net profit margin) is more likely to be manipulated by company executives than operating income (the numerator in operating margin); therefore, we use both measures as dependent variables in different regression specifications. The formal definitions and descriptions of these firm performance measures are reported in Table I.

Table 1. Variable Definitions and Summary Statistics

Variable	Definition	Mean	Std. Dev.
Net profit margin (%)	Net income divided by gross revenue on the income statement	2.46	5.94
Operating margin (%)	Operating income divided by gross revenue	2.16	5.19
log(Total assets)	Natural log of total assets on the balance sheet	12.1	1.06
Leverage	Total debt divided by total assets	0.635	0.342
Liquidity	Current assets divided by current liabilities	1.85	0.906
Num of employees (,000)	Total number of employees in thousands	1.57	1.25
Pay dispersion ($)	Weighted average range of hourly wage among all job functions within the hospital. The weight is the number of employees in each job function.	17.3	7.01
Num of low-skill workers (,000)	Total number of employees with low-skilled in thousands.	0.595	0.425
Pay dispersion of low-skill workers ($)	Weighted average range of hourly wage among low-skilled workers. The weight is the number of employees in this category.	10.8	4.65
Num of mid-skill workers (,000)	Total number of employees with mid-skilled in thousands	0.243	0.223
Pay dispersion of mid-skill workers ($)	Weighted average range of hourly wage among mid-skilled workers. The weight is the number of employees in this category.	16.3	6.17

[10] Though some doctors are hospital employees, most doctors are not. Non-employee doctors are independent contractors. This data set does not include either employee or non-employee doctors.

Table 1. Continued

Variable	Definition	Mean	Std. Dev.
Num of high-skill workers (,000)	Total number of employees with high-skilled in thousands.	0.723	0.618
Pay dispersion of high-skill workers ($)	Weighted average range of hourly wage among high-skilled workers. The weight is the number of employees in this category.	23.2	9.96

The summary statistics in Table I illustrates that the average net profit margin is 2.5% with a standard deviation of 5.9%, whereas the average operating profit margin is 2.2% with a standard deviation of 5.2%. It appears that hospitals in the state of Maryland are more profitable than the rest of hospitals in the U.S. For example, the average net profit margin and the average operating margin of all U.S. hospitals that reported their financial statements to the Centers for Medicare & Medicaid Services (CMS) in 2010 are 1.4% and -1.5% respectively.[11]

Because the data on maximum and minimum hourly wage rate are grouped into 64 job functions by HSCRC, we calculate the (hourly) pay range for each job function as a measure of function-level pay dispersion for each hospital. The function-level pay range of job function *j* in hospital *i* is calculated as follows:

$$Range_{i,j} = Maximum\ Rate_{i,j} - Minimum\ Rate_{i,j}$$

This measure of pay range is called the Spread of Pay in Gupta et al. (2012), Becker and Huselid (1992), Kepes et al. (2009), Shaw et al. (2002), and Leonard (1990). The dispersion of pay rate at the hospital level is defined as the weighted average of our estimates of the function-level pay range. The weights are the proportions of employees in these job functions.

$$Dispersion_i = \sum_{j=1}^{64} \frac{NumEmployee_{i,j}}{TotalEmployee_i} Range_{i,j}$$

The mean of pay dispersion or range in our sample is $17.3 per hour with a standard deviation of $7.01. It should be cautioned that using range to measure pay dispersion is very sensitive to outliers because range is determined by the furthest outliers at either end of the distribution, hence reflecting information about extreme values but not necessarily about typical values. When the range is narrow, meaning that there are no outliers, it does reflect information about typical values in the data. Given the minimum hourly pay rage of $2.26 and the maximum range of $43.57 per hour in our sample, we believe that this measure at least provide an upper bound for wage dispersion in Maryland hospitals.

In addition, pay dispersion in different job functions (requiring different skill levels) may create different incentives for employees in these categories, and in turn, affect hospital outcomes differently. We need to create a variable that can characterize the skill levels by ranking the

[11] This is based on the data at the Healthcare Cost Report System (HCRIS).

importance and complexity of these job functions, and hopefully to categorize them into high- and low-skilled levels. However, it remains an empirical challenge to construct such variable because the process of assigning scores and ranking job importance and complexity is subjective and somewhat hospital specific. Therefore, we make an assumption that higher skill levels are associated with higher levels of pay, and rank the 64 job functions based on the mean hourly wage rate. We categorize the job functions into three skill levels based on the ranking: high-, mid-, and low-skilled.

Further, within our analyses, we also control for the size of hospital, financial leverage and operating liquidity. There are two variables measuring different dimensions of hospital size: (1) total assets on the balance sheet that reflects the size of a firm's financial and fixed capital and (2) the number of employees in the hospital that is commonly used in the economics literature when information on total assets is not available (Cabral and Mata, 2003). To avoid the problem of skewed distribution of hospital asset size and potential outliers that may bias the regression results, we use a natural logarithm transformation of the total assets to normalize its distribution: $AssetSize_i = \log(Total\ Assets_i)$. Financial leverage, defined as the debt-to-asset ratio, is the degree to which a hospital is utilizing borrowed money, mainly in the form of debt financing. Leverage magnifies increases in hospital earnings during periods of rising operating income due to the tax benefits of debt but adds significant risk of financial distress at the same time because of added interest obligations. Because hospitals that are highly leveraged may be providing better return to investments and having higher probability of bankruptcy at the same time, leverage has been commonly used in the corporate literature as a measure of risk-taking behavior. The current ratio is a financial ratio that measures whether or not a hospital has enough resources to pay its debts over the next year. It compares a hospital's current assets to its current liabilities. The current ratio is an indication of a hospital's liquidity or the ability to meet its creditor's demands.

Methodology

We estimate the effect of pay dispersion on hospital financial performance by fitting hospital-level regression equations that take the form:

$$Profitability_i = \alpha + \beta_1 \times Size_i + \beta_2 \times Leverage_i + \beta_3 \times Liquidity_i + \beta_4 \times StaffSize_i + \beta_5 \times Dispersion_i + \varepsilon_i$$

Here the profitability of the hospital is measured by two different variables: net profit margin and operating margin. Pay dispersion, which is the range of hourly wage rate, is the variable of interest in this regression analysis. To control for hospital-specific effects, we employ control variables to account for hospital size, financial leverage, operating liquidity, and year fixed-effects.

As discussed previously, different jobs require different levels of skill; pay dispersion in different job functions may incentivize workers in these skill categories differently, and in turn, affect business outcomes differently. Therefore, the second test is to examine the implications of pay dispersion at different skill levels for hospital productivity. We collect job titles and wage information for all non-executive and non-physician staffs and rank the importance and complexity of these job functions based on the mean wage level of each job title. Using this ranking we then categorize hospital workers into three skill levels: high, mid and low, as shown in Table 2.

Table 2. Classification of Job Skill Levels and Job Functions

3-level Job Skill (1=low, 2=mid, 3=high)	Job Function Code	Job Function Definition
1	1	IP/OP ADM & REGISTRATION CLERK
1	2	BILLING CLERK
1	3	CASHIER - BUSINESS OFFICE
1	4	GENERAL OFFICE CLERK
1	10	DIETARY AIDE I
1	12	ENVIRONMENTAL SERVICE WORKER
1	14	LABORATORY ASSISTANT
1	19	MAIL CLERK
1	20	MAINTENANCE MECHANIC I
1	22	MEDICAL RECORDS AND CODING CLERK
1	28	MEDICAL TRANSCRIPTIONIST
1	32	PATIENT CARE/NURSING AIDE I
1	33	PATIENT CARE/NURSING AIDE II
1	34	PHARMACY TECHNICIAN
1	40	ADMINISTRATIVE ASSISTANT
1	41	SECURITY OFFICER
1	45	MATERIALS HANDLER, OPERATIONS LEVEL
1	48	TELEPHONE OPERATOR
1	50	UNIT CLERK/SECRETARY
1	55	COLLECTION CLERK
1	56	COOK
1	64	PHLEBOTOMIST
2	6	DIETITIAN
2	7	EKG CARDIOLOGY TECHNICIAN
2	8	EXECUTIVE ASSISTANT
2	8	EXECUTIVE SECRETARY
2	15	LABORATORY TECHNICIAN I
2	16	LABORATORY TECHNICIAN II
2	23	MED RCRDS & CODING TECH, ART OR CMRT
2	46	SURGICAL TECHNICIAN
2	47	MATERIALS HANDLER, PROF. LEVEL
2	54	ACCOUNTING/ACCTS PAYABLE/PAYROLL CLERK
2	65	PHYSICAL & OCCUPATIONAL THERAPIST ASSIST.
2	9	INFORMATION SYSTEMS/STAFF LEVEL
2	18	LICENSED PRACTICAL NURSE
2	21	MAINTENANCE MECHANIC II
2	25	MEDICAL SOCIAL WORKER M.S.W.
2	26	SOCIAL WORKER (B.S.)
2	27	MDCL. TECHNOLOGIST (A.S.C.P)
2	36	RADIOLOGIC TECHNOLOGIST (RRT REG.)
2	38	RESPIRATORY THERAPHY TECH.(CERTIFIED)
2	44	STATIONARY ENGINEER LICENSED
2	53	ACCOUNTANT/FINANCIAL ANALYST
2	68	HUMAN RESOURCES, ASSOCIATE LEVEL

Table 2. Continued

3-level Job Skill (1=low, 2=mid, 3=high)	Job Function Code	Job Function Definition
3	11	GENERAL DUTY NURSE
3	13	INFORMATION SYSTEMS/PROFESSIONAL LEVEL
3	17	PHYSICIAN'S ASSISTANT
3	29	NUCLEAR MEDICINE TECHNOLOGIST (REG.)
3	31	NURSE PRACTITIONER/CLIN. NURSE SPEC
3	35	PHYSICAL THERAPIST
3	37	MRI TECHNOLOGIST
3	39	RESP. THERAPIST (NBRT REGISTERED)
3	42	SPECIAL PROCEDURES TECHNOLOGIST
3	43	STAFF AND CLINICAL PHARMACIST
3	49	ULTRASOUND TECHNOLOGIST
3	57	C.T. TECHNOLOGIST
3	58	NURSE EDUCATORS
3	59	NURSE MANAGER A
3	60	NURSE MANAGER B
3	61	NURSE MANAGER C
3	62	NURSE MANAGER D
3	63	OCCUPATIONAL THERAPIST
3	66	UTILIZATION REVIEW/QUAL ASSUR SPEC/CASE MGR
3	67	SPEECH LANGUAGE PATHOLOGIST OR AUDIOLOGIST
3	69	HUMAN RESOURCES, MGMT. LEVEL

Ideally, we would simply regress the profitability measure of each business division (e.g., impatient care unit) on the wage dispersion of nurses and other supporting staffs in that unit. Unfortunately, this is an aggregate dataset that provides the distribution information of employee wage at the job function level in each hospital; in other words, there is no separate performance measure for each job function within the organization. This is the reason that we aggregate the job function-level data to firm-skill-level data before conducting regression analysis. After obtaining the number of employees and wage dispersion for high-, mid-, and low-skilled categories, we conduct the following regression:

$$\begin{aligned} Profitability_i = {} & \alpha + \beta_1 \times Dispersion_i \times Size_i + \beta_2 \times Leverage_i + \beta_3 \times Liquidity_i + \beta_4 \times LowSkillStaffSize_i \\ & + \beta_5 LowSkillPayDispersion_i + \beta_5 \times MidSkillStaffSize_i + \beta_6 MidSkillPayDispersion_i \\ & + \beta_7 \times HighSkillStaffSize_i + \beta_8 HighSkillPayDispersion_i + \varepsilon_i \end{aligned}$$

The model specification is very similar to the previous regression specification but with the breakdowns of high-, mid-, and low-skilled workers to identify the underlying forces of the (dis)incentive effects.

Results

We first discuss the results using hospital-level aggregate data. In these specifications, we estimate the effects of pay dispersion of all employees within the hospital on financial performance, measured in both hospital operating margin and net profit margin. Table 3 reports coefficient estimates for the covariates of interest and other control variables, by which we account for firm size, financial leverage, operating liquidity, and year fixed-effects.

Table 3. Regressions of Worker Pay Dispersion and Hospital Profitability

Dependent Variable:	Operating Margin (%)		Net Profit Margin (%)	
	(1)	(2)	(3)	(4)
log(Total Assets)	-1.006* (-1.691)	-0.986 (-1.650)	-0.975 (-1.409)	-0.878 (-1.336)
Leverage	-2.364 (-1.592)	-2.235 (-1.492)	-2.913* (-1.687)	-2.360 (-1.433)
Liquidity	0.327 (0.599)	0.348 (0.634)	1.005 (1.585)	1.090* (1.807)
Num of Employee	2.107*** (4.079)	2.108*** (4.067)	1.697*** (2.826)	1.701*** (2.985)
Pay Dispersion	-0.131** (-1.987)	-0.140** (-2.087)	-0.0779 (-1.015)	-0.116 (-1.584)
Constant	14.23** (2.023)	13.48* (1.898)	12.94 (1.583)	9.511 (1.218)
Year Fixed-Effects	No	Yes	No	Yes
N	143	143	143	143
Adj. R-square	0.141	0.135	0.113	0.201
F-Test	5.65***	4.16***	4.61***	6.09***

Note: All four specifications use OLS regression, and z-statistics are shown in the parentheses with ***, ** and * indicating its statistical significant level of 1%, 5% and 10% respectively.

We find a negative and highly significant effect of employee pay dispersion on operational profitability in column (1) and column (2) which includes year fixed-effects (coefficients are -0.131** and -0.140** respectively). Additionally, larger hospitals as measured by the number of employees, tend to have better financial outcomes, which is consistent with the findings in the previous studies including Abowd, Kramarz and Margolis (1999), Brown and Medoff (1989), Ferrer and Lluis (2008), and Oi and Idson (1999). Taking this evidence at face value, a natural interpretation is that wage dispersion might have fostered a negative perception of unfair compensation practices; hence reduced the health care workers' willingness to cooperate with other workers; as a result, wage dispersion increases transaction costs and reduces operating efficiency. When we change the hospital performance measure to net profit margin in column (3) and column (4) which includes year fixed-effects, the coefficient estimates become insignificant for both regression specifications (coefficients are -0.078 and -0.116 respectively, but without statistical significance). It would not be surprising to see the vanishing significance of the influence

of wage dispersion on business outcomes as ample evidence exists in the literature supporting both theories of the positive effect (Beaumont and Harris 2003; Eriksson 1999; Heyman 2005; Lallemand et al. 2004; Winter-Ebmer and Zweimüller 1999) and the negative effect (Bloom 1999; Charness and Kuhn 2007; Grund and Westergaard-Nielsen 2008; Leonard 1990; O'Reilly et al. 1988; Pfeffer and Langton 1993).

To further understand the underlying mechanisms (i.e., the potential roles of worker skill level and the size of workforce of each skill level), we need to test the hypothesis that high-skilled workers are more concerned about the pay equity and welfare and low-skilled workers are more likely to be motivated by monetary rewards. To do so, we break down the workers in each hospital to high, mid- and low-skilled categories as discussed in the previous methodology section, and repeat the regression analysis. Table 4 reports the regression coefficient estimates.

Table 4. Regressions of Pay Dispersion of Three Skill Categories and Hospital Profitability

Dependent Variable:	Operating Margin (%)		Net Profit Margin (%)	
	(1)	(2)	(3)	(4)
log(Total Assets)	-2.454*** (-3.803)	-2.430*** (-3.766)	-2.347*** (-2.977)	-2.261*** (-3.074)
Leverage	-2.686* (-1.901)	-2.545* (-1.795)	-3.008* (-1.742)	-2.500 (-1.547)
Liquidity	0.403 (0.774)	0.428 (0.820)	1.021 (1.604)	1.108* (1.864)
Num of low-skill workers	22.74*** (3.709)	23.55*** (3.819)	19.51** (2.604)	22.45*** (3.192)
Num of mid-skill workers	16.21 (1.184)	16.80 (1.225)	18.81 (1.125)	20.93 (1.338)
Num of high-skill workers	-10.99*** (-2.655)	-12.01*** (-2.864)	-10.02** (-1.981)	-13.70*** (-2.865)
Pay dispersion among low-skill workers	0.905*** (2.845)	0.885*** (2.775)	0.800** (2.059)	0.730** (2.006)
Pay dispersion among mid-skill workers	0.0915 (0.520)	0.103 (0.584)	0.128 (0.594)	0.169 (0.841)
Pay dispersion among high-skill workers	-0.367*** (-3.585)	-0.373*** (-3.637)	-0.331*** (-2.644)	-0.351*** (-3.007)
Num of low-skill workers × Pay dispersion among low-skill workers	-0.954** (-2.428)	-0.977** (-2.476)	-1.019** (-2.122)	-1.101** (-2.447)

Table 4. Continued

Dependent Variable:	Operating Margin (%)		Net Profit Margin (%)	
	(1)	(2)	(3)	(4)
Num of mid-skill workers × Pay dispersion among mid-skill workers	-0.409 (-0.698)	-0.384 (-0.654)	-0.711 (-0.993)	-0.621 (-0.928)
Num of high-skill workers × Pay dispersion among high-skill workers	0.246** (2.086)	0.254** (2.157)	0.332** (2.309)	0.363*** (2.700)
Constant	24.72*** (3.490)	23.71*** (3.332)	23.24*** (2.685)	19.61** (2.418)
Year Fixed-effects	No	Yes	No	Yes
N	143	143	143	143
Adj. R-square	0.273	0.274	0.171	0.279
F-Test	5.45***	4.83***	3.44***	4.93***

Note: All four specifications use OLS regression, and z-statistics are shown in the parentheses with ***, ** and * indicating its statistical significant level of 1%, 5% and 10% respectively.

Notice that the sign on the regressor of wage dispersion of the low-skilled workers is statistically positive across all four specifications (e.g., coefficient is 0.905^{***} in column 1), suggesting that this group is very sensitive to the incentive value of the monetary reward and that tournament effects are large enough to be of considerable interest. The fact that the interaction term between staff size and wage dispersion has a negative coefficient (e.g., -0.954^{***} in column 1) implies a crowding-out behavior; that is, as the number of workers increase in this group, monetary incentives (i.e., tournament effects) are being crowded out and fairness considerations (i.e., cohesiveness effects) are becoming stronger for this group of low-skilled workers.

In the case of high-skilled workers, the situation is reversed. The coefficient of the wage dispersion of this group of mostly highly paid employees is statistically significantly negative (e.g., -0.367^{***} in column 1). This result is somewhat surprising given prior findings in the literature that bonus, stock and options have been widely used in compensation contracts of high-tech workers, middle managers and senior executives. We must remember that the hospitals in our samples are not publicly-traded companies (not even for-profit business) but, instead are non-profit organizations whose objective function is not profit-maximization. Thus, the most plausible interpretation is that these high-skilled health care workers, mostly technicians, senior nurses, and mid-managers, primarily care about maximizing the patients' welfares rather than the hospital's financial outcomes. Apparently, wage inequality among skilled workers can potentially cause insecurity and frustration and the perception of unfairness is a major cause of poor staff morale. The interaction term between staff size and wage dispersion, however, is positive (e.g., coefficient is 0.246^{***} in column 1), suggesting that as the size of this workforce group increases, the negative effect of wage inequality dies away. The empirical finding of this mean-reversion phenomenon, to some extent, contradicts the theoretical model of Valsecchi (1996) which predicts that compensation

level increases as the number of activities and the complexity of tasks grow because they create opportunities for shirking in teams, which need to be suppressed by higher incentives. Finally, neither the staff size nor the wage dispersion of the mid-skilled worker group has an impact on the financial performance of the hospital.

One should simply be reminded that senior executives play a critical role in deciding their hospital's human resource practices including recruiting, training, performance review and compensation (Rousseau and Greller, 1994); unfortunately, the Maryland Health Services Cost Review Commission (HSCRC) does not require hospitals to report compensation information of hospital senior managers (i.e., CEOs and CFOs) in this dataset of Wage and Salary Survey Results. Executive compensation has always captured a considerable amount of attention from the media, policymakers, and general public. The recent economic recession of 2008-2010 brought about increased scrutiny of executive compensation, and much of the debate in the health care sector is focused on whether the continuing rise of their pay is justifiable while hospital financial performance is deteriorating and employees are losing their jobs (Kramer and Santerre, 2010). To take into account of the (dis)incentive effects induced by the pay disparity not only among senior executives but also between executives and non-executive employees, we calculate the compensation difference between the top and bottom earners within the hospital executive team and the wage gap between the average compensation of top executives and the average pay of non-executive employees in the same hospital. The compensation data of senior managers are obtained from the hospital's annual IRS filing of Form 990 provided by the National Center for Charitable Statistics (NCCS). According to the Internal Revenue Service, tax-exempt organizations such as not-for-profit hospitals with annual gross receipts of at least $200,000 or total assets of at least $500,000 must file Form 990. Table 5 reports the results of pooled cross-sectional regressions, in which the operating margin is the dependent variable. The positive association between the "executives vs. employees" wage gap and operational profitability (coefficient is 0.219^{**} in column 1 and 0.243^{**} in column 2), along with the evidence of a positive relationship of executive compensation dispersion and hospital financial performance (coefficient is 0.0028^{**} in column 2), clearly supports the incentive effects of tournament models, at least from the senior officials in the hospital C-Suite. To identify the source of the effect, we further break down the "executives vs. employees" wage gap into three categories based on job skill levels, and, not surprisingly, the tournament effect comes mainly from the gap between executive compensation and the pay of rank and file employees (coefficient of low-skilled workers is 0.773^{***} in column 3 and 0.890^{***} in column 4). Although the disincentive effect (lack of cohesiveness as a result of pay inequality) does exist and mainly comes from the pay gap in mid-skilled workers (coefficient is -0.389^{**} in column 3), the statistical significance diminishes when the executive compensation dispersion is included in the model (coefficient is -0.311^{*} in column 4, but only at 10% significance level).[12]

[12] The fact that the level (rather than the dispersion) of executive compensation is negatively related to operating margin (e.g., coefficient is -0.218^{**} in column 1) should not be surprising because it is an expense that is recognized in the hospital income statement.

Table 5. Regressions of Pay Dispersion with Executive Pays and Hospital Profitability

Dependent Variable:	Operating Margin (%)			
	(1)	(2)	(3)	(4)
log(Total Assets)	1.036**	1.032**	1.032**	1.031**
	(2.177)	(2.249)	(2.205)	(2.302)
Leverage	-0.435	0.297	-1.310	-0.612
	(-0.238)	(0.166)	(-0.697)	(-0.337)
Liquidity	0.580	0.256	0.537	0.120
	(0.875)	(0.393)	(0.809)	(0.183)
Num of Employee	0.324	0.606	0.358	0.614
	(0.801)	(1.494)	(0.896)	(1.560)
Executive compensation	-0.218**	-0.247**	-0.376**	-0.497***
	(-2.212)	(-2.585)	(-2.141)	(-2.863)
Pay dispersion among top executives		0.0028**		0.0029***
		(2.570)		(2.761)
Pay dispersion between top executives and all workers	0.219**	0.243**		
	(2.211)	(2.535)		
Pay dispersion between top executives and low-skill workers			0.773***	0.890***
			(2.836)	(3.368)
Pay dispersion between top executives and mid-skill workers			-0.389**	-0.311*
			(-2.180)	(-1.797)
Pay dispersion between top executives and high-skill workers			-0.00810	-0.0864
			(-0.0464)	(-0.510)
Constant	-4.454	-3.420	-8.398	-6.537
	(-0.650)	(-0.517)	(-1.242)	(-1.005)
N	80	80	80	80
Adj. R-square	0.248	0.302	0.293	0.353
F-Test	5.35***	5.88***	5.08***	5.79***

Note: All specifications use OLS regression, and z-statistics are shown in the parentheses with ***, ** and * indicating its statistical significant level of 1%, 5% and 10% respectively.

It is worth mentioning that the wage dispersion over time is also affected by retirees who recently left the hospital and newcomers who just joined the company. We are aware of the fact that our study is primarily focused on incumbents, because employee turnover in non-profit organizations is relatively low: the average job turnover rate among non-profit employers is 21 percent, less than half the average of their for-profit counterparts (Philanthropy Journal, 2008).[13]

[13] The higher wage in for-profits and public sector institutions is an important factor driving employees of nonprofit organizations to seek better job opportunities (Kang, Huh, Cho and Auh, 2015).

Discussion

There is a growing recognition in the literature that the relationship between wage distribution and business performance depend on the skills of the workforce and the uncertainty of the economic environment, which could potentially dilute the results and conclusions obtained from prior research. In this study, we found a positive effect of wage dispersion among low-skilled workers on hospital financial outcomes and a negative effect of wage dispersion among high-skilled workers on outcomes. More importantly, there is an offsetting effect from the workforce size of each skill category that mitigates the associations between pay distribution and financial outcomes: The positive effect of wage dispersion among low-skilled workers on outcomes is reduced when the number of low-skilled workers increases. Similarly, the negative effect of wage dispersion among high-skilled workers on outcomes is reduced when the number of high-skilled worker increases. Such an update in the literature is critical to understanding how pay dispersion at different skill levels affect the overall productivity of nonprofit hospitals that disproportionally rely on intrinsically motivated health care workers.

One explanation of this negative offsetting effect from the size of low-skilled employees could be the consequence of "public wages" (Nosenzo, 2012). The likelihood of wage distribution becoming public information to the low-skilled workers may increase with the size of the workforce. When health care workers learn that they are underpaid relative to co-workers, they tend to exert less effort; hence, pay fairness becomes an important concern in this case. One response to this phenomenon for the hospital managers is to reduce the wage dispersion within this staff group. For the high-skilled employees, this positive offsetting effect from the workforce size can be caused by "monitoring difficulty" (Garen, 1985). When the size of this workforce increases in the hospitals, it becomes more difficult to monitor this group of highly paid employees, mainly consisted of senior assistants, technicians and mid-managers. As a result, senior managers are less likely to detect the subtler aspects of worker quality and their exerted efforts; therefore, they have to rely more on tournament incentives to motivate high-skilled workers.

The correlations between wage dispersion, workforce size, skill level, and hospital performance, however, do not necessarily imply causality. For example, the observed wage dispersion in a hospital could be the outcome of its financial performance. One argument can be that hospitals with higher earnings are likely to use tournament incentives, and the other argument can be that hospitals with lower earnings are likely to compress wage dispersion. To address this issue, we identify the 2008 financial crisis as an exogenous "shock" to hospitals and assume that this national economic crisis increased the unemployment rate and wage distribution temporarily. Indeed, we find that the pay dispersion of hourly wage among all employees increased from $15.5 in 2008 to $16.1 in 2010. For low-skilled workers, the dispersion increased from $9.8 to $10.5, whereas for high-skilled workers, it increased from $19.3 to $20.2. During the same period, the median profit margin of all Maryland hospitals increased from 0.92% in 2008 to 5.04% in 2010, suggesting that the expansion of wage gap might have improved productivity in terms of financial profitability in the sample hospitals.

Conclusion

In recent years, hospital wage policy has attracted considerable debate amongst health care practitioners, academics, and politicians. In part, this has reflected a desire to understand the factors behind the worker incentive design and pay equity in not-for-profit health care organizations. Despite a large body of theoretical and empirical papers on how wage dispersion and pay fairness might be part of organizational strategies to motivate or discourage employees to maximize their efforts, prior literature of examining the relation between wage dispersion and financial outcomes of hospitals is scarce, and little research has been done into the underlying mechanisms and the potential roles of worker skill level and the size of workforce with different skill levels. It has been argued that non-profit organizations rely more on intrinsically motivated employees because they can not afford paying higher salary than their for-profit counterparts. If this is indeed the case, not-for-profit hospitals will be more likely to exhibit wage dispersion as part of their organizational strategies. It is also important to note that younger nonprofit workers consider monetary rewards an important factor in their attraction and retention to potential employer; therefore, the compensation practices with focus on non-wage incentives will likely not serve a younger generation of workforce (McGinnis, 2011). The findings of this paper not only substantiate the role of wage dispersion in improving nonprofit organization (hospital) performance, but also provide additional evidence suggesting that certain organizational wage policies, such as high dispersion for low-skilled workers and low dispersion for high-skilled workers, may be preferred to the extent that they improve the productivity of nonprofit institutions.

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