

# No mission? No motivation. On hospitals' organizational form and charity care provision

Nadia Burani 

Department of Economics, University of Bologna, Bologna, Italy

## Correspondence

Nadia Burani, Department of Economics, University of Bologna, Piazza Scaravilli 2, 40126 Bologna, Italy.  
Email: [nadia.burani@unibo.it](mailto:nadia.burani@unibo.it)

## Funding information

Alma Mater Studiorum Università di Bologna, Grant/Award Number: ALMAIDEA\_2017 No. 24042  
Open Access Funding provided by Università di Bologna within the CRUCARE Agreement.

## Abstract

A healthcare provider faces two decision problems. On the one hand, it chooses its organizational form: a hospital can be a for-profit institution providing compensated care only, or it can be a nonprofit organization whose mission is enhancing access to care for uninsured, low-income patients. On the other hand, the provider chooses which health professionals to hire, without observing their heterogeneous skills and their pro-social motivation. These decisions are related because an increase in the percentage of revenues, that the nonprofit hospital sacrifices for charity care, might enhance the motivation of its workers and induce some of them to donate their labor, that is, to volunteer. Accordingly, this article analyzes the provider's optimal screening contracts, which are contingent on workers' ability and satisfy limited liability, and relates them to the optimal choice of its mission-orientation. The results provide a new rationale for: (a) the emergence of different organizational forms for hospitals, such as for-profits and nonprofits, which complement public hospitals in the provision of health care, (b) the heterogeneity in the degree of charity care chosen by different nonprofit hospitals.

## KEYWORDS

charity care, for-profit versus nonprofit providers, optimal labor contracts, volunteerism, workers' motivation

## JEL CLASSIFICATION

D86, I11, L31, J24, M51

## 1 | INTRODUCTION

In recent years, the delivery of collective goods and services (i.e., those with both private and social returns) has no longer been the prerogative of governments. In health care, education and research, just to mention the most relevant sectors, increasing importance have acquired private pro-social providers such as nonprofit organizations.<sup>1</sup> According to Salamon (2012) and to the 2020 Nonprofit Employment Report by the Center for Civil Society Studies at Johns Hopkins University, there are approximately 2 million nonprofits that operate in the United States and that account for approximately

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\$2 trillion in revenue. The nonprofit workforce is the largest in the US economy when the estimated 4.5 million volunteer workers are added to the 13.5 million paid employees.

This is particularly true in the US healthcare industry, where nonprofit organizations dominate healthcare production and account for half of its total employment (Lakdawalla & Philipson, 2006).<sup>2</sup> In addition, 14% of the total health sector output is produced by volunteer activities (Christian, 2007). A distinctive feature of nonprofit hospitals in the United States is that they cohere around the same pro-social mission: being charitable toward more vulnerable patients.<sup>3</sup> Indeed, most US nonprofit hospitals have adopted charity care policies, that consist in delivering free or discounted medical treatment to poor patients who are not covered by private insurance, nor by Medicaid or other indigent care programs. Nikpay and Ayanian (2015) show that although 94% of nonprofit hospitals had charity care policies in place in 2012, charity care represented only 2% of hospital operating expenses on average, with considerable variation across providers.

Whether nonprofit hospitals provide adequate charitable efforts to justify their competitive advantage over for-profits (often achieved through a series of preferential legal and public policies, including tax exemptions and tax-deductible donations), still is a contentious issue (Cram et al., 2010). Despite the lively public and political debate,<sup>4</sup> very little research has been carried out to explain what induces nonprofit hospitals to be charitable toward vulnerable patients, and to what extent. Frank and Salkever (1991), Banks et al. (1997), and Sachs (2020) represent a few, scattered exceptions. What these, mainly empirical, studies have in common is that they cast some doubts about pure altruism being the driver of charity care policies adopted by nonprofit hospitals.

The present paper contributes to this debate and tries to address the following interrelated research questions. First, why would hospitals choose different organizational forms, such as nonprofit and for-profit, to complement public institutions in the provision of health care? Second, why and how much would nonprofit hospitals engage in charitable activities, or else which are the sources of heterogeneity in the degree of charity care observed among nonprofit hospitals in the United States? Third, how do providers with different organizational forms operate in the labor market? In particular, which are the incentives that for-profit or nonprofit hospitals provide to their health professionals, with a particular emphasis on volunteer workers?

In order to answer these questions, I build a theoretical model featuring healthcare providers that face two sequential decision problems. Initially, hospitals choose their organizational form, that is, they decide on nonprofit or for-profit status. A for-profit provider strictly pursues the objective of profit maximization, by delivering health care only to those able to pay. A nonprofit hospital, instead, becomes a mission-oriented organization that sacrifices part of its payoffs to enhance access to care for the most vulnerable patients. When a hospital opts for the nonprofit status, it simultaneously chooses how much to adhere to its mission, that is how much charity care to supply. Subsequently, nonprofit or for-profit hospitals enter the labor market and decide which labor contracts to offer their prospective workers, thus determining which type of health professionals to hire. In this respect, hospitals use pay-for-performance incentive schemes in order to induce their employees to exert the desired level of effort or amount of care. Moreover, I assume that a nonprofit hospital has a competitive advantage relative to the for-profit provider because the former is able to attract motivated workers, that is, health professionals who are not only moved by pecuniary incentives, but who enjoy their personal contribution to the mission and charitable cause of their employer.<sup>5</sup>

I analyze this sequence of decision problems backwards, and I thus start from the last one. Accordingly, the first portion of the analysis focuses on a single hospital's optimal contracting problem, taking the degree of mission-orientation (i.e., charity care) of the provider and the level of worker motivation as given. The hospital is willing to hire potential applicants, who have heterogeneous and unobservable skills but the same observable level of motivation, and who are limitedly liable. To do so, it offers screening contracts that consist in different combinations of verifiable effort and non-linear wage. Each worker selects the preferred effort-salary pair thus revealing her private information about ability. When worker motivation is sufficiently high, the most able health professionals are separated, whereas volunteerism is the contractual outcome for the least able workers, who are asked to provide the same effort level (irrespective of their skills) in exchange for a null reward. Instead, when motivation is low, the optimal contract is fully separating and volunteerism does not occur.

Building on these insights, in the second part of the analysis (i.e., at the first decision node), the strategic choice of the hospital mission is studied. To keep the analysis focused, the mission of the hospital is conceived as a one-dimensional attribute and it coincides with the percentage of revenues that the provider devotes to charity care. Notice that mission choice is equivalent to the choice of the organizational form, because for-profit providers do not pursue any pro-social mission and do not invest in charity care, whereas nonprofit hospitals do sacrifice some resources for charity care. Moreover, I consider that the hospital's involvement in charity care positively affects the pro-social motivation of its health professionals through a deterministic relationship called *mission-motivation function*. This function represents one of

the first attempts of modeling workers' preferences about their employer's mission, which is inspired by the evidence provided by Serra et al. (2011).<sup>6</sup> In this respect, I depart from much of the theoretical literature about worker motivation, which treats pro-social motivation as an exogenous worker characteristic, without explaining where it comes from.<sup>7,8</sup> Given the mission-motivation function and given the optimal contract that screens workers for their heterogeneous ability, the possible solutions to the mission-choice problem of the hospital are then found. In particular, conditions are derived under which the hospital chooses to be either a for-profit organization, which retains all its profits and neglects charitable goals, or a nonprofit organization, which sacrifices some of its revenues for charity care. In this latter case, the nonprofit hospital may prefer to induce a sufficiently high motivation in its workforce, so that the least able workers become volunteers, or may find it more convenient to rely on paid work only, keeping its investment in charity care (and thus its employee motivation) low enough.

To conclude, observe that the analysis performed might shed new light not only on the sources of heterogeneity in hospitals' organizational form but also on the sources of heterogeneity in the degree of charity care observed among nonprofit hospitals. Indeed, different hospitals might have different expectations or beliefs about the pool of prospective workers they are facing, in particular about the effect that their pro-social initiatives have on worker motivation (in other words, about which mission-motivation function is relevant). This would favor the emergence of different organizational forms among hospitals, such as pure for-profits or nonprofits, and, on top of that, would generate heterogeneity in the degree of charity care chosen by different nonprofit hospitals.

## 1.1 | Related literature

The present analysis is related to several strands of theoretical literature, not confined to health economics: incentives and motivation, providers' organizational form, and competition among providers.

First, there is a steadily growing literature on incentives and motivation that can further be partitioned in two main branches, according to whether incentive contracts are designed to solve a problem of hidden information (i.e., adverse selection and screening) or hidden action (i.e., moral hazard). On the one hand, some literature considers the effects of asymmetric information about workers' characteristics (motivation being one of them) on the design of screening contracts. Focusing on health economics, Heyes (2005), Jack (2005) and Choné and Ma (2011) consider nurses or physicians who are privately informed about their altruism toward patients. The objective is to study how worker motivation can be used to screen and, eventually, sort workers. I instead focus on the motivational effect of mission on worker effort, an effect that does not have to be filtered through the process of employment selection. Siciliani (2009) considers doctors who, besides differing in their altruism, care about their reputation among patients or colleagues. He shows that pay-for-performance schemes, intended to promote higher care provision, influence doctors' reputation and might crowd out their motivation. In my model, reputational or image concerns are absent, so crowding-out effects are not an issue. A richer setup with bidimensional screening is considered in Barigozzi and Burani (2016a, 2016b), where optimal incentives are provided to elicit workers' private information about both their motivation and ability.<sup>9</sup> Finally, the design of incentive contracts when health professionals are privately informed about their productivity while their altruism is observable and homogeneous is the subject of Makris (2009) and Makris and Siciliani (2013). These papers are closely related to the first part of the present analysis, because they consider incentive schemes contingent on health care workers' ability only. Nonetheless, their results are different because (due to a type-dependent administrative constraint) incentives have to be provided in order to discourage less productive workers from pretending to be more productive. In the present model, the opposite occurs.

On the other hand, the second part of the present paper owes to some other literature on incentives and motivation that analyzes moral hazard issues in mission-oriented organizations. This literature has been pioneered by Besley and Ghatak (2005), who highlight the importance of matching the mission preferences of firms and workers in order to save on monetary incentives. Their idea is that missions are like a form of horizontal product differentiation, with firms having alternative and exogenously given missions, and motivated workers being heterogeneous as to which mission they prefer. I depart from this view because I analyze the vertical aspect of diversification in mission choice, and consider how different degrees of involvement in a given charitable activity affect the division of surplus within a hospital-worker pair. This is precisely what Besley and Ghatak (2018, section 4.2) suggest when relating motivation to the concept of social identity (as in Akerlof & Kranton, 2000, 2005). Indeed, employees can internalize the pro-social goals of the organization they work for and become motivated. Then it becomes worthwhile for a firm to undertake costly actions that enhance workers' motivation. Finally, Besley and Ghatak (2017) link the mission choice of the firm to its organizational form,

namely to whether the organization takes the status of a for-profit, nonprofit, or social enterprise. The latter balances profit and purpose and selects its managers on the basis of their motivation for resolving this conflict of interests.

Second, this paper is also related to the extensive literature on firms' organizational form. Concerning the choice between for-profit and nonprofit status, Glaeser and Shleifer (2001) and Ghatak and Mueller (2011) introduce a non-distribution constraint for nonprofit firms that works as a commitment device in the presence of agency problems (contractual incompleteness and non-verifiability). The former shows that completely self-interested entrepreneurs might opt for not-for-profit status because this allows them to charge higher prices to customers who correctly anticipate higher quality. The latter argues that the not-for-profit status helps inducing greater labor supply from intrinsically motivated workers.<sup>10</sup> In these articles, the non-distribution constraint is modeled by letting nonprofit entrepreneurs appropriate only a given fraction of profits and I exploit this idea of a voluntary loss when assuming that nonprofit hospitals sacrifice a fraction of their revenues for charity care. Related mechanisms are also present in the literature on corporate social responsibility, showing that the pursuit of pro-social goals might be consistent with profit maximization (see Bénabou & Tirole, 2010; Besley & Ghatak, 2007; Kitzmueller & Shimshack, 2012). In particular, I share with Bénabou and Tirole (2010) the notion of corporate social responsibility as being about "sacrificing profits in the social interest", and their "delegated philanthropy" argument, whereby corporations would engage in socially responsible behavior on behalf of stakeholders (employees, consumers, investors).

Third, another strand of the health economics literature studies competition among hospitals (with possibly different organizational forms) in the final goods market or in the factor market.<sup>11</sup> Brekke et al. (2011, 2012), Laine and Ma (2017), and Besley and Malcomson (2018) explore the implications, in terms of quality of service, of competition among semi-altruistic providers, or between nonprofit hospitals and either public or for-profit providers, respectively. As for competition between health providers in the labor market, Barigozzi and Burani (2016b) consider bidimensional screening contracts when a nonprofit hospital competes against a for-profit provider for skilled and motivated workers. They find that the nonprofit hospital tends to provide a higher amount of care while offering lower salaries than the for-profit rival. Moreover, sorting of workers between hospitals is independent of ability and such that more motivated health professional always prefer to be hired by the nonprofit hospital.<sup>12</sup> This happens when motivation depends on effort provision (warm glow), as in the present case. When, instead, motivation is independent of effort and screening contracts are contingent on ability only, as in Barigozzi and Burani (2019), more skilled workers self-select into the organization that, holding a competitive advantage, can afford to pay higher wages.<sup>13</sup> The models featuring mixed oligopolistic markets are certainly well suited to study how different organizations design their incentive contracts and how workers self-select among different organizations. Nonetheless, such models are less appropriate to analyze hospitals' choice of their organizational structure, because, in these environments, firms are exogenously assigned to a given category (nonprofit vs. for-profit, or public vs. private etc.) and operate accordingly. Focusing on a single employer, instead, allows to predict what structural form the hospital decides to take. Finally, although the monopsony power of the provider is crucial for the results, one should not consider this as an implausible assumption: the charitable purpose served by a nonprofit hospital gives it a unique trait, and monopsony power arises naturally when worker motivation is related to this firm-specific characteristic.

## 2 | THE BASIC MODEL

The basic model is based on Burani and Palestini (2016), but it is extended in order to introduce the organization's mission and to take into account its impact on the firm's objective function, on workers' preferences and, ultimately, on screening contracts.

Consider a principal-agent model with hidden information. The principal is an organization like a hospital (or a nursing home) willing to hire an agent (she), namely the health professional, to perform a given task. Both the hospital and the health professional are risk neutral.

The hospital provides care according to a linear technology in which labor is the only input. Let  $e$  denote the observable and contractible effort level that the health professional exerts. Effort  $e$  can also be interpreted as the number of hours that a physician or a nurse is asked to work, or, more generally, as the quantity of care supplied. The hospital's production function is  $q(e) = e$ , which indicates the output produced or the number of procedures and diagnoses done, or, equivalently, the number of patients treated for each level  $e$  of effort provided. The hospital's objective function is chosen so as to fit both organizational forms (for-profits and nonprofits).<sup>14</sup> It is more general than pure profit and simply represents

a measure of the relation between revenues from production and personnel costs.<sup>15</sup> Specifically, the hospital's payoff, per-worker and conditional on the worker being hired, is

$$\pi(e, w(e)) = (\alpha p_1 + (1 - \alpha) p_2) q(e) - w(e) = \alpha e - w(e). \quad (1)$$

The term  $w(e)$  represents the total non-linear wage or salary paid (or else the pay-for-performance scheme offered) to the health professional who exerts effort level  $e$ . All costs other than wage payments are set equal to zero. The term  $(\alpha p_1 + (1 - \alpha) p_2) q(e)$  denotes the hospital's revenues, where  $p_1$  and  $p_2$  are the unit prices of output that the hospital can charge. Price  $p_1$  is relevant when the hospital engages in compensated care and treats insured patients or patients who can afford out-of-pocket payments for their treatments; price  $p_1$  is taken as given by the hospital, as in Diagnosis-Related Group (DRG) systems, which are such that the hospital is paid a fixed amount for every procedure performed or patient treated, and it is normalized at  $p_1 = 1$ . Price  $p_2$ , instead, is relevant when the hospital engages in charity care and delivers treatment to uninsured and poor patients. Such price  $p_2$  is also fixed and it is set at  $p_2 = 0$ . Accordingly,  $\alpha \in [0, 1]$  describes the percentage of revenues that the hospital retains, whereas its complement  $(1 - \alpha)$  represents the percentage of revenues that the provider sacrifices for socially worthwhile goals such as charity care. This formulation captures in a stylized way the hospital's commitment to its mission and allows to subsume the hospital's choice of organizational form within its mission choice. Indeed, when  $\alpha = 1$ , the hospital is purely profit-oriented and it is only interested in compensated care. Conversely, when  $\alpha < 1$ , the hospital is a nonprofit, mission-oriented organization which delivers both charity and compensated care. Notwithstanding, the nonprofit hospital bears the same labor costs irrespective of whether the patients treated are paying or not.<sup>16</sup> In the extreme case in which  $\alpha = 0$ , the hospital is a charitable institution operating only for the public interest, at a constant deficit of receipts over disbursements.<sup>17</sup>

Let us now turn to examine agents. Health professionals differ in their ability of providing care, which lowers their cost of effort provision  $\theta$ . High realizations of  $\theta$  represent doctors or nurses with a high cost of effort provision and thus low ability, whereas low realizations of  $\theta$  correspond to a low cost of providing care and thus to high skills. Worker ability cannot be observed by the hospital, which only knows the probability distribution of skills across the whole population of health professionals. For simplicity, I assume that ability is uniformly distributed in the unit interval, so that  $\theta \sim U[0, 1]$ .

For each possible ability type  $\theta$ , worker utility is quasi-linear in income and takes the form

$$u(e, w(e), \theta) = w(e) - \frac{1}{2}(\theta + 1)e^2 + \gamma e. \quad (2)$$

The first argument is income, represented by the total nonlinear wage, which in turn depends on the amount of effort exerted. The second argument is the cost of providing effort, which is increasing and convex in effort. Effort cost is also affected by worker type  $\theta$ , with higher values of  $\theta$  (lower ability levels) being associated with higher disutility of effort.

Notice that  $\frac{\partial^2 u}{\partial e \partial \theta} < 0$  always holds, and this amounts to the well-known single-crossing condition being satisfied. Putting it differently, the indifference curves of different worker types cross only once in the space  $(e, w)$ . The last term in expression (2), namely  $\gamma e$ , represents worker pro-social motivation, with  $\gamma \in [0, 1]$ .<sup>18</sup> As in Francois (2000), Makris (2009), and Makris and Siciliani (2013),  $\gamma$  is assumed to be homogeneous across all health professionals.<sup>19</sup> The present specification is consistent with worker motivation coming from two different sources: task involvement and goal identification. As for the first source, observe that motivation is positively related to effort exertion or care provision, so it is an *output-dependent* or *warm glow* (or else impurely altruistic) *motivation* (see Andreoni, 1989). To a certain extent, workers derive a non-monetary benefit from exerting effort and providing treatment to sick patients. This reminds of the 'joy of healing' mentioned in the modernized version of the Hippocratic oath.<sup>20</sup> As for the second source, motivation is also a *mission-oriented motivation*. Health professionals, who are employed at nonprofit hospitals, enjoy their personal contribution to the advancement of the hospital's goal, that is, provision of care to indigent patients.<sup>21</sup> These two sources of worker motivation are deeply intertwined because health care workers enjoy providing treatment to sick patients insofar as they expect that, by so doing, they are also going to meet the need of the most vulnerable people to hospital care.<sup>22</sup>

If workers are not hired by the hospital, they receive zero utility: health professionals have a null outside option. Moreover, health professionals do not own any asset when they start their relationship with the hospital, and so they must be protected by limited liability, meaning that  $w(e) \geq 0$ . As shown in Burani and Palestini (2016), if this were not the case, highly motivated health professionals would be willing to accept labor contracts which consist in positive levels of effort provision paired with strictly negative transfers from the employing organization.<sup>23</sup>

## 2.1 | The optimal screening contracts

For expositional purposes, let us proceed backwards and consider the provider optimal contracting problem first.

The hospital aims at eliciting the private information about ability of its prospective health professionals. In order to do so, for the time being, let's focus on the following simplified situation. Let's take the hospital's mission, as represented by the level of  $\alpha$ , as given (it will be endogenized in what follows, see Section 3). Moreover, let worker motivation  $\gamma$  be not only uniform across workers, but also observable to the hospital. In the sequel (see again, Section 3), I'll assume that worker motivation is unobservable to the hospital, although it can be correctly inferred because it is driven by the hospital's choice of its mission.

The hospital maximizes its expected payoffs. Applying the *Revelation Principle*, one can focus on type-contingent contracts of the form  $\{e(\theta), w(\theta)\}$ , assuming that the hospital chooses effort level  $e(\theta)$  and total salary  $w(\theta) \equiv w(e(\theta))$  based on the worker's truthful report of her ability type  $\theta$ . A health professional of type  $\theta$ , accepting to exert effort  $e(\theta)$  when faced with wage  $w(\theta)$ , has indirect utility or *information rent* equal to

$$U(\theta) = w(\theta) - \frac{1}{2}(\theta+1)e(\theta)^2 + \gamma e(\theta). \quad (3)$$

Solving (3) for  $w(\theta)$  and taking limited liability into account, one has

$$w(\theta) = \max \left\{ U(\theta) + \frac{1}{2}(\theta+1)e(\theta)^2 - \gamma e(\theta), 0 \right\}. \quad (4)$$

Notice that, when both  $e(\theta) < \frac{2\gamma}{\theta+1}$  and  $U(\theta) < \gamma e(\theta) - \frac{1}{2}(\theta+1)e(\theta)^2$  hold, the liability constraint is binding and  $w(\theta) = 0$ .

Finally, substituting (4) into (1) and taking the expectation over  $\theta$ , one can write the hospital's problem as

$$\max_{e(\theta), w(\theta)} \int_0^1 [\alpha e(\theta) - w(\theta)] d\theta = \max_{e(\theta)} \int_0^1 \left[ \alpha e(\theta) - \max \left\{ U(\theta) + \frac{1}{2}(\theta+1)e(\theta)^2 - \gamma e(\theta), 0 \right\} \right] d\theta, \quad (P1)$$

subject to

$$\frac{\partial e(\theta)}{\partial \theta} \leq 0, \quad (C.1)$$

$$\frac{\partial U(\theta)}{\partial \theta} = -\frac{1}{2}e(\theta)^2, \quad (C.2)$$

$$U(\theta) \geq 0 \text{ for all } \theta \in [0, 1]. \quad (C.3)$$

Condition (C.1) is the *monotonicity condition*, requiring that the schedule of effort be decreasing in the type of worker, namely that more skilled health professionals should be asked to provide more effort. Condition (C.2) is the *envelope condition*, stating that the information rent left to the worker be decreasing in the type of worker: more skilled health professionals should receive higher indirect utility. This comes from the fact that it is always in the interest of a given type of worker to under-report her ability and try to mimic a worker with lower skills, that is, higher  $\theta$ . Together, conditions (C.1) and (C.2) characterize incentive compatibility. Finally, condition (C.3) is the *participation* or *individual rationality constraint*, requiring that all worker types be left with an indirect utility that weakly exceeds their null outside option.

The above program is solved using the Hamiltonian technique, with  $e(\theta)$  being the control and  $U(\theta)$  being the state variable (see Appendix A1 in supporting information S1 for more details). The solution yields the following optimal incentive scheme.

**PROPOSITION 1 Optimal contracts under limited liability.** *When workers' ability  $\theta$  is not observable to the hospital, the optimal contract is such that the hospital asks workers to provide effort*

$$e^*(\theta) = \begin{cases} \frac{\alpha + \gamma}{2\theta + 1} & \text{for } 0 \leq \theta \leq \bar{\theta} = \frac{\alpha}{2\gamma} \\ \gamma & \text{for } \bar{\theta} = \frac{\alpha}{2\gamma} \leq \theta \leq 1 \end{cases}$$

and offers the wage schedule

$$w^*(\theta) = \begin{cases} \frac{[3\alpha + 2\theta(2\alpha - \gamma)](\alpha - 2\theta\gamma)}{4(2\theta + 1)^2} & \text{for } 0 \leq \theta \leq \frac{\alpha}{2\gamma} \\ 0 & \text{for } \frac{\alpha}{2\gamma} \leq \theta \leq 1 \end{cases},$$

with information rents being equal to

$$U^*(\theta) = \begin{cases} \frac{(\alpha + \gamma)^2 - \gamma(2\theta + 1)(2\alpha - \gamma)}{4(2\theta + 1)} & \text{for } 0 \leq \theta \leq \frac{\alpha}{2\gamma} \\ \frac{(1 - \theta)\gamma^2}{2} & \text{for } \frac{\alpha}{2\gamma} \leq \theta \leq 1 \end{cases}.$$

*Proof.* See Appendix A1 in supporting information S1.

Optimal screening contracts satisfy two standard properties in incentive theory. The first one is *no-distortion-at-the-top*: the effort level required from the most able type of health professional  $\theta = 0$  is not distorted with respect to the first-best solution, namely  $e^*(0) = e^{FB}(0) = \alpha + \gamma$ . Nonetheless, the optimal effort levels set for workers with lower skills are distorted downwards relative to the full-information solution. This allows the hospital to save in information rents, which are positively related to effort provision. Secondly, optimal contracts satisfy the property of *zero-rents-at-the-bottom*: the least able type of health professional  $\theta = 1$  is left with an indirect utility that equals her outside option, namely  $U^*(1) = 0$ . Despite that, all workers with higher skills receive positive information rents, which prevent them from under-reporting their ability type.

Furthermore, optimal contracts have an interesting feature, which originates from the interplay between incentive compatibility and limited liability. On the one hand, incentive compatibility forces the hospital to distort effort schedules downwards as a means of reducing information rents left to health professionals; on the other hand, limited liability prompts the hospital to increase effort levels required from its health professionals as a response to the lower bound in compensations. These two opposing forces prevent the monotonicity condition from holding with strictly inequality and trigger a change in the nature of the optimal contract. In particular, full separation of types can no longer be guaranteed. Thus, there exists a threshold level of workers' ability  $\bar{\theta}$  which makes the contract switch from separating to pooling. Health professionals whose skills are higher (or else whose effort cost is lower) than the threshold, that is, types such that  $0 \leq \theta \leq \bar{\theta}$ , are offered a separating contract characterized by an effort schedule  $e(\theta)$  which is downward distorted with the respect to the first-best and strictly decreasing in  $\theta$ , and by a transfer scheme  $w(\theta)$  which is strictly positive and strictly decreasing in  $\theta$ . Conversely, health professionals whose skills are lower than (or whose effort cost exceeds) the threshold, that is, types such that  $\bar{\theta} \leq \theta \leq 1$ , are offered a pooling contract characterized by a strictly positive and constant level of effort (equal to their homogeneous motivation) and by a null wage. These latter workers are thus volunteers to the hospital.

Figure 1 represents the optimal contracts (effort and wage schedules).

So far, optimal screening contracts have been described in relation to the different ability levels of health professionals, that represent workers' private information. Nonetheless, effort, wage and utility schedules also depend on two more (and up to now exogenous) variables, namely the hospital's amount of compensated care  $\alpha$  and worker motivation  $\gamma$ . Then, let me now consider the impact of  $\alpha$  and  $\gamma$ , respectively, on optimal incentive schedules.

A marginal increase in the fraction of compensated care  $\alpha$ , in the region where separation of types occurs, leads to an increase in effort levels required from health professionals. This happens because a higher fraction of compensated care clearly means a higher fraction of revenues retained by the hospital. Then, the hospital has incentive to increase the total number of patients treated and, to do so, it needs to increase the amount of medical care supplied by health professionals. As for wages and information rents, it can easily be shown that they are positively related to the fraction of compensated care. Again, higher hospital revenues are associated to a higher amount of medical care, which in turn commands an increase in salary and a corresponding increase in the indirect utility offered to health professionals. In

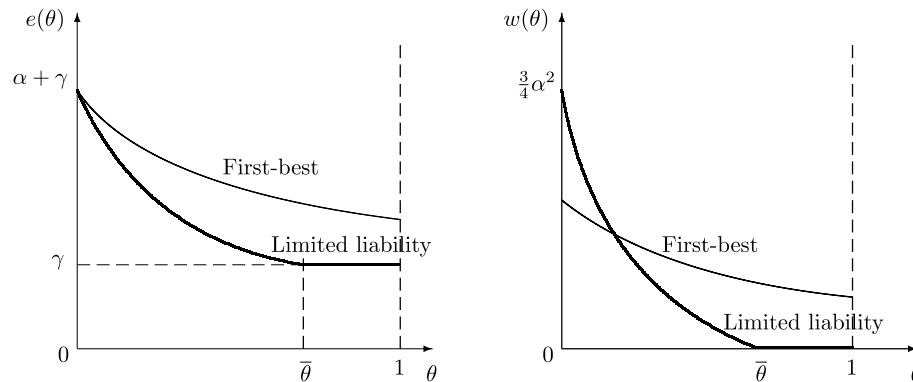


FIGURE 1 Optimal contracts: effort (left) and wage (right) schedules

the region where pooling of types occurs, a marginal increase in the fraction of compensated care has no effects on effort, salary or information rents.

Furthermore, a marginal increase in the level of motivation  $\gamma$ , in the region where separation of types occurs, is associated to an increase in effort provision and a decrease in salary. These are the effects of the donative-labor hypothesis. In addition, an increase in motivation yields higher information rents, because health professionals' motivation is output-dependent: higher motivation translates into higher effort or higher amount of care and this, in turn, increases the agent's indirect utility. Finally, in the region where pooling of types occurs, an increase in workers' motivation determines an increase in the level of medical care and an increase in information rents, but it has no effects on salaries.

These results have important implications for human resource management within the hospital. Indeed, if, with a slight abuse,  $e$  is interpreted as *quality* rather than quantity of care, one could conclude that high-ability health professionals are doctors who provide high-quality care and receive relatively high salaries; for them limited liability has no bite. Conversely, low-skilled health professionals are nurse aides who provide low-quality care: a mission-oriented non-profit hospital might be able to hire them as volunteers.

Importantly, notice that the ability threshold  $\bar{\theta} = \frac{\alpha}{2\gamma}$  is decreasing in both worker motivation and hospital mission, meaning that the lower worker motivation  $\gamma$  and/or the higher the fraction  $\alpha$  of revenues that the hospital retains as compensated care (i.e., the lower the fraction  $1 - \alpha$  of charity care that the hospital delivers), the higher  $\bar{\theta}$ . Thus, it is possible that the threshold exceeds the support of the distribution of ability types, that is, that  $\bar{\theta} > 1$ . In this case, the set of types for which pooling occurs has measure zero and the optimal contract becomes fully separating. Specifically, full separation of types arises when workers' motivation is sufficiently low, given the fraction of revenues retained, that is, when  $\gamma < \frac{\alpha}{2}$ , or when the fraction of compensated care set by the hospital is sufficiently high, given the level of workers' motivation, that is, when  $\alpha > 2\gamma$ . If the threshold is such that  $\bar{\theta} > 1$ , then optimal effort and wage schedules  $\{e^*(\theta), w^*(\theta)\}$  are both strictly decreasing in workers' types  $\theta$ , for all  $\theta \in [0, 1]$ . Moreover, limited liability has no bite, so all health professionals receive a strictly positive salary and volunteers are absent from the hospital's workforce.

What emerges from the above discussion is that the interplay between hospital's charity care and its workers' motivation becomes crucial in determining which scenario will prevail. The next section addresses these issues.

### 3 | THE OPTIMAL CHOICE OF MISSION AND ORGANIZATIONAL FORM

Given the optimal contract, and knowing that the constraint imposed by limited liability is binding when workers' motivation and/or the hospital's mission are sufficiently high, let me take a step back.

Let me endogenize employees' motivation to work  $\gamma$  and make it positively depend on the hospital's level of investment in its mission. This is in line with the view that a crucial determinant of worker motivation is how well individual health worker goals are in alignment with the mission of the employer (see Franco et al., 2002). According to these authors, one of the key ways in which health worker motivation can be enhanced is by increasing resources available to accomplish organizational goals. Conversely, the introduction of barriers to essential health care services may conflict with individual worker's beliefs of health care as a social good, and hence, make it difficult for workers to identify with their employer. Furthermore, societal culture also affects worker motivation through worker interactions with their pa-



tients. Providers may deny to deliver certain types of treatment that is not affordable for the hospital, patients may instead expect to receive and value these treatments. When such a situation occurs, health workers experience a conflict, and the outcome (in terms of their motivation) will depend on worker values and their degree of social embeddedness within their communities.<sup>24</sup>

More concretely, I assume that the hospital anticipates it will be able to induce the desired level of motivation in its prospective employees by strategically setting the percentage of revenues to be devoted to charity care: a nonprofit hospital expects that the higher its level of non-compensated care is, the higher the motivation (and therefore the labor donations) of its health professionals. Indeed, suppose that workers' motivation behaves according to a continuous and differentiable function  $\gamma(\alpha)$ , which is called *mission-motivation function*, satisfying the following minimal requirements:

- To each level of  $\alpha$  set by the hospital, there corresponds a unique level of motivation  $\gamma$  on the part of health professionals. Motivation should be bounded above, so that labor donations are not excessive. Thus,  $\gamma(\alpha) : [0, 1] \rightarrow [0, 1]$ . This is consistent with the basic model outlined in previous Section 2.
- The lower the hospital's commitment to charity care, that is, the higher  $\alpha$ , the lower worker motivation  $\gamma$ . Hence,  $\gamma'(\alpha) < 0$  for all  $\alpha \in (0, 1)$ .
- When the hospital sets  $\alpha = 1$  behaving like a pure profit-seeker, then worker motivation drops to zero, whereas when the hospital provides charity care only and makes zero revenues, then worker motivation is maximal. Thus,  $\lim_{\alpha \rightarrow 0} \gamma(\alpha) = 1$  and  $\lim_{\alpha \rightarrow 1} \gamma(\alpha) = 0$ .

Then, worker utility function (2) becomes

$$u(e, w(e), \theta, \alpha) = w(e) - \frac{1}{2}(\theta + 1)e^2 + \gamma(\alpha)e. \tag{5}$$

This is consistent with some previous theoretical work in the field of incentives and motivation. In particular, Cassar and Meier (2018) state that individuals are in search for meaning from their work, beyond monetary compensations, and that “an organization or a job with a social mission will be more likely to fulfill workers' drive for sense-making” (p. 218). They consider a worker's utility function such that the first two arguments are the same as in Equation (5), and the third is the ‘production function of meaningful work’ or worker motivation (see pp. 224–225). This function increases with worker's effort  $e$ , because motivation arises only when the employee is actually exerting effort, and it also increases with a specific aspect of job meaning, that is, the employer's social mission. Finally, as in (5), the marginal effect of effort on producing meaningful work is assumed to be increasing in the mission. Along the same lines, Besley and Ghatak (2018, p. 429) consider a worker's utility function with the same three arguments as in (5), the last one being effort  $e$  multiplied by a strictly increasing and concave function mapping the amount of resources invested by a firm into worker ‘motivational capital’. The microeconomic foundation of such pro-social motivation is related to the concept of identity (Akerlof & Kranton, 2000, 2005), seen as the capacity of workers to identify with their firm and to internalize its objectives.<sup>25</sup>

The fact that worker motivation depends on  $\alpha$  according to the mission-motivation function  $\gamma(\alpha)$  changes not only workers' utility but also the optimal screening contract  $\{e^*(\theta), w^*(\theta)\}$  (see Proposition 1). Substituting the latter into hospital payoff (1) and taking the expectation over  $\theta$ , reduces the hospital's problem to the unconstrained choice of the optimal level of its mission. Such alternative program can be written as

$$\max_{\alpha} E[\pi(\alpha)] = \begin{cases} \int_0^{\frac{\alpha}{2\gamma(\alpha)}} \left( \frac{(\alpha + \gamma(\alpha))^2 (4\theta + 1)}{4(2\theta + 1)^2} + \frac{\gamma(\alpha)(2\alpha - \gamma(\alpha))}{4} \right) d\theta + \frac{\alpha(2\gamma(\alpha) - \alpha)}{2} & \text{if } 0 \leq \alpha \leq 2\gamma(\alpha) \\ \int_0^1 \left( \frac{(\alpha + \gamma(\alpha))^2 (4\theta + 1)}{4(2\theta + 1)^2} + \frac{\gamma(\alpha)(2\alpha - \gamma(\alpha))}{4} \right) d\theta & \text{if } 2\gamma(\alpha) \leq \alpha \leq 1 \end{cases} \tag{P2}$$

Notice that condition  $\alpha \leq 2\gamma(\alpha)$  in program (P2) corresponds to condition  $\bar{\theta} = \frac{\alpha}{2\gamma} \leq 1$  in the optimal contract  $\{e^*(\theta), w^*(\theta)\}$  which solves program (P1). Therefore, when the fraction of compensated care is sufficiently low that  $0 \leq \alpha \leq 2\gamma(\alpha)$ , the hospital anticipates that it will separate high-skilled health professionals, whose types are such that  $\theta \in [0, \bar{\theta}]$ , and pool low-ability types  $\theta \in [\bar{\theta}, 1]$ , who become volunteers to the hospital. Conversely, when the fraction of compensated care is sufficiently high that  $2\gamma(\alpha) \leq \alpha \leq 1$ , the hospital anticipates that  $\bar{\theta} \geq 1$  and that limited liability will

not be binding. So, the hospital can offer a fully separating contract to all its prospective workers, but it will not be able to resort to volunteer work.

The first-order conditions associated to program (P2) impose to balance several effects (see Appendix A.2.1 in supporting information S1). First of all, an increase in the level of compensated care  $\alpha$  yields higher payoffs to the hospital directly in the form of higher revenues. Nonetheless, an increase in  $\alpha$  triggers a decrease in motivation which negatively affects the effort level provided by health professionals and their labor donations. In turn, a decrease in labor donations means that the optimal salary has to increase, for each possible level of effort provided. This has a detrimental effect on hospital payoffs. On the other hand, an increase in  $\alpha$  decreases hospital payoffs because it reduces the mass of volunteer workers who are offered the pooling contract, and also because it decreases the fixed effort level provided by these volunteers.

In general, there is no guarantee that problem (P2) is well-behaved, that the hospital payoff function is strictly concave in its domain and that the associated first-order conditions have a unique and interior solution. Nonetheless, a solution to the above program can be envisaged once a specific mission-motivation function  $\gamma(\alpha)$  is considered. In what follows, I'll focus attention on a very broad family of functions  $\gamma(\alpha)$  and explicitly compute the optimal  $\alpha^*$  that solves problem (P2), with the associated level of motivation  $\gamma(\alpha^*)$ .

### 3.1 | The Kumaraswamy distribution and its survival function

The characteristic features of the mission-motivation function  $\gamma(\alpha)$  are that it is defined on a bounded support, namely the interval  $[0,1]$  and, most importantly, that it is continuous and monotonically decreasing from  $\gamma(0) = 1$  to  $\gamma(1) = 0$ . These properties are also distinctive of a well-known function in probability theory and statistics which is the *survival function*, denoted by  $S$  and providing the probability that a random variable takes values (i.e., survives) beyond a given threshold.<sup>26</sup>

Then, the mission-motivation function  $\gamma(\alpha)$ , which relates the fraction of revenues retained by the hospital (or else the fraction of compensated care) to workers' motivation can be conceived, and treated mathematically, as a survival function, with  $S = \gamma(\alpha)$ . In particular, I consider the survival function associated to the Kumaraswamy distribution,<sup>27</sup> which has the following, extremely simple form

$$S(\alpha) = \gamma(\alpha) = (1 - \alpha^x)^y \text{ for } 0 \leq \alpha \leq 1, \quad (6)$$

where  $x$  and  $y$  are two strictly positive parameters that determine the shape of the function. It can be easily shown that, by varying the values taken by the two parameters  $x$  and  $y$ , the above specification of  $\gamma(\alpha)$  spans the entire square  $[0,1] \times [0,1]$ . In particular,  $\gamma(\alpha)$  can be strictly concave, if  $x > 1$  and  $y < 1$ , or strictly convex, if  $x < 1$  and  $y > 1$ , or turn from convex to concave, if  $x < 1$  and  $y < 1$ , and vice-versa. Table 1 summarizes the possible shapes of the mission-motivation function depending on the values taken by its parameters.

Considering program (P2), performing the integration with respect to worker ability  $\theta$ , and inserting the mission-motivation function given by (6) in place of  $\gamma(\alpha)$ , one gets an alternative program which is

$$\max_{\alpha} E[\pi(\alpha)] = \begin{cases} \frac{\left(\alpha + (1 - \alpha^x)^y\right)^2}{4} \left( \ln \left( \frac{\alpha + (1 - \alpha^x)^y}{(1 - \alpha^x)^y} \right) - \frac{\alpha}{2(\alpha + (1 - \alpha^x)^y)} \right) + \frac{\alpha(7(1 - \alpha^x)^y - 2\alpha)}{8} & \text{if } 0 \leq \alpha \leq \bar{\alpha} \\ \frac{\left( (3 \ln 3 - 1) \left( \alpha + (1 - \alpha^x)^y \right)^2 + 3(1 - \alpha^x)^y (2\alpha - (1 - \alpha^x)^y) \right)}{12} & \text{if } \bar{\alpha} \leq \alpha \leq 1 \end{cases}, \quad (P2bis)$$

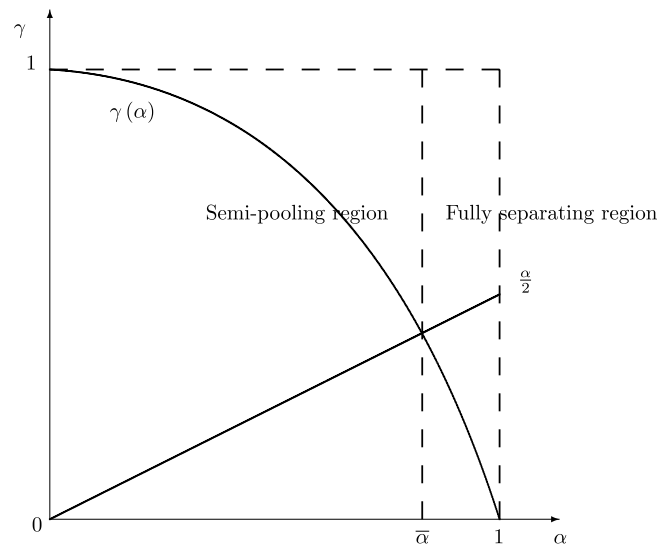
where

$$\bar{\alpha} \equiv \text{solution to } 2\gamma(\alpha) = \alpha \Leftrightarrow (1 - \alpha^x)^y = \frac{\alpha}{2}. \quad (7)$$

TABLE 1 Characteristics of the mission-motivation function for different parameterizations

	$y < 1$	$y = 1$	$y > 1$
$x < 1$	<ul style="list-style-type: none"> <li>Convex when <math>\alpha</math> is low, concave when <math>\alpha</math> is high</li> <li>Mostly below (resp. above) top-left to bottom-right diagonal when <math>x</math> is low (resp. high) w.r.t. <math>y</math></li> </ul>	Strictly convex	Strictly convex
$x = 1$	Strictly concave	Straight line: Top-left to bottom-right diagonal	Strictly convex
$x > 1$	Strictly concave	Strictly concave	<ul style="list-style-type: none"> <li>Concave when <math>\alpha</math> is low, convex when <math>\alpha</math> is high</li> <li>Mostly below (resp. above) top-left to bottom-right diagonal when <math>x</math> is low (resp. high) w.r.t. <math>y</math></li> </ul>

FIGURE 2 Cutoff between fully separating and semi-pooling regions for  $x = 1.5$  and  $y = 0.5$



Observe that the first row in program (P2bis) corresponds to the case in which the optimal contract is semi-pooling being  $0 \leq \alpha \leq 2\gamma(\alpha)$ . As said, this condition parallels inequality  $0 < \bar{\theta} \leq 1$  in the solution to program (P1). Conversely, the second row corresponds to the case in which the optimal contract is fully separating and  $2\gamma(\alpha) \leq \alpha \leq 1$  holds, or else  $\bar{\theta} \geq 1$  in the solution to program (P1).

Graphically, the cutoff  $\bar{\alpha}$  can be found at the intersection between the straight line with equation  $\alpha / 2$  and the actual plot of the mission-motivation function (6), once specific values are assigned to parameters  $x$  and  $y$  (see Figure 2).

The behavior of the cutoff  $\bar{\alpha}$  influences the solution to the above program. Indeed, Equation (7) might not have an interior solution within the relevant interval  $[0, 1]$ . In particular, when  $y$  tends to zero, one gets  $\bar{\alpha} = 2$ , meaning that, for sufficiently low  $y$ , worker motivation is sufficiently high that limited liability is binding and semi-pooling contracts with volunteer work emerge. Consequently, one can disregard the second row in program (P2bis), which applies to separation of all ability types, and concentrate on the first row only. In this case, the hospital will always choose the nonprofit status and set  $\alpha^* < 1$ . Alternatively, when  $x$  tends to zero, one gets  $\bar{\alpha} = 0$ , meaning that, for sufficiently low  $x$ , the motivation of health professionals is always sufficiently low that full separation of types is viable and limited liability never binds, no matter what the charity care level set by the hospital is. Therefore, one can disregard the first row in program (P2bis), which includes pooling contracts, and concentrate only on the second row. In this other case, a corner solution with  $\alpha^* = 1$  might prevail, meaning that the hospital will opt for the for-profit status.

Next section presents the various classes of findings that are obtained when the mission-motivation function  $\gamma(\alpha)$  coincides with the survival function of the Kumaraswamy distribution and when its parameters  $x$  and  $y$  take different possible combinations.<sup>28</sup>

### 3.2 | Main results

The parallel established between the mission-motivation function  $\gamma(\alpha)$  and the survival function of the Kumaraswamy distribution allows to predict, for each possible behavior of the mission-motivation function: (i) the optimal level of social mission (i.e., the fraction of charity care), if any, set by the hospital and, more generally, whether the hospital chooses the nonprofit or the for-profit status; (ii) the induced level of motivation of the potential workforce; finally, (iii) the optimal screening contracts offered by the hospital to its health professional, and, in particular, whether the nonprofit hospital employs volunteers or not.

Different scenarios emerge. First of all, suppose that the mission-motivation function is sufficiently convex, so that it lies well below the top-left bottom-right diagonal and close to the axes. This occurs when  $x$  is sufficiently smaller than 1 and  $y$  is sufficiently bigger than 1. Then, it is not worth the while for the hospital to invest a substantial fraction of its revenues in a social mission. Indeed, only when the hospital reduces its revenues sizably, by way of heavily investing in charity care, does it induce some motivation in its workforce. So, the benefits coming from labor donations are modest compared to the costs associated to charity care. Consequently, the hospital prefers to behave like a standard profit-maximizing institution and hire health professionals who are only moved by pecuniary incentives and do not donate their labor. Consider now the case in which the mission-motivation function is still convex, lies below the top-left bottom-right diagonal, but close to it. This happens when  $x$  and  $y$  are getting closer to one (from below and from above, respectively). In this situation, the hospital might find it optimal to engage in some moderate charity care. The hospital would be a nonprofit organization, staffed with mildly motivated health professionals whose limited liability constraint is never binding. In any event, when the mission-motivation function is convex, the hospital is able to fully screen its prospective workers for their heterogeneous and unobservable ability.

Conversely, suppose that the mission-motivation function is concave and lies above the top-left bottom-right diagonal. This occurs when  $x$  is bigger than 1 and  $y$  is smaller than 1. Then, it pays the hospital to choose the nonprofit status and sacrifice only a small fraction of its revenues in charity care. This generates a strong motivation in its prospective employees anyway; labor donations by health professionals will then be sizable, and the limited liability constraint will bind for low-skilled workers. This prevents the hospital from fully eliciting workers' private information about their ability and forces it to offer a pooling contract to the least able health professionals, who become volunteers.

In between, when the mission-motivation function changes its curvature and has either an inverted S-shape (for  $x$  and  $y$  both bigger than 1) or the reverse pattern (for  $x$  and  $y$  both smaller than 1), the results depend on whether convexity or concavity prevail, and on whether the prevailing curvature is moderate or not.

In order to summarize the results obtained, I propose a table which has the same structure as Table 1 (presenting the behavior of the mission-motivation function as obtained from the Kumaraswamy distribution), describing the qualitative features of the mission choice adopted by the hospital and of its optimal screening contracts.<sup>29</sup>

**PROPOSITION 2 Optimal mission choice.** Consider the mission-motivation function  $\gamma(\alpha) = (1 - \alpha^x)^y$  and let  $\tilde{x} = \frac{3 \ln 3 - 1}{3 \ln 3 + 2} = 0.43352$ ,  $\tilde{y} = 1.57414$  and  $\bar{y} \cong 1.4$ . Then, Table 2 describes the hospital's optimal mission choice and the optimal screening contracts that it offers to its prospective workers.

*Proof.* For convenience, I first consider the cases in which either  $x = 1$  and  $y \leq 1$  or  $y = 1$  and  $x \geq 1$  (see Corollary 1 below and its proof in Appendix A.2.4 in supporting information S1) and then I turn to the remaining instances (see Appendix A.2.5 in supporting information S1).

The result that follows focuses on a particular case of Proposition 2: it provides sufficient conditions under which the hospital sacrifices a positive fraction of its revenues to improve health care access for uninsured and low-income patients, and, on top of that, is able to hire volunteer low-skilled labor.

**COROLLARY 1 Sufficient conditions for volunteerism.** Consider the mission-motivation function  $\gamma(\alpha) = (1 - \alpha^x)^y$ . If  $x = 1$  and  $y \leq 1$  or else if  $x \geq 1$  and  $y = 1$ , so that  $\gamma(\alpha)$  is (weakly) concave, then: (i) the optimal mission choice is such that the hospital chooses the nonprofit status, sacrifices a strictly positive fraction of revenues for charity care, that is,  $\alpha^* < 1$ , and hires health professionals with positive motivation  $\gamma(\alpha^*) > 0$ ; (ii) the optimal incentive contract is separating for health professionals with high ability, that is,  $0 \leq \theta \leq \frac{\alpha^*}{2\gamma(\alpha^*)}$ , and pooling for health professionals with low ability, that is,  $\frac{\alpha^*}{2\gamma(\alpha^*)} \leq \theta \leq 1$ , who become volunteers.

*Proof.* See Appendix A.2.4 in supporting information S1.

TABLE 2 Optimal mission choice for different parameter values

	$y < 1$	$y = 1$	$y > 1$
$x < 1$	<ul style="list-style-type: none"> <li><math>\alpha^* &lt; 1</math> nonprofit</li> <li>Pooling and volunteerism when <math>x</math> is high w.r.t. <math>y</math></li> <li>Full separation when <math>x</math> is low w.r.t. <math>y</math></li> </ul>	<ul style="list-style-type: none"> <li>Full separation</li> <li><math>\alpha^* = 1</math> for <math>0 &lt; x \leq \tilde{x}</math></li> <li><math>\alpha^* &lt; 1</math> for <math>\tilde{x} &lt; x &lt; 1</math></li> </ul>	<ul style="list-style-type: none"> <li><math>\alpha^* = 1</math> for-profit</li> <li>Full separation and no mission</li> </ul>
$x = 1$	<ul style="list-style-type: none"> <li><math>\alpha^* &lt; 1</math> nonprofit</li> <li>Pooling and volunteerism</li> </ul>	<ul style="list-style-type: none"> <li><math>\alpha^* &lt; 1</math> nonprofit</li> <li>Full separation</li> <li>One volunteer: <math>\theta = 1</math></li> </ul>	<ul style="list-style-type: none"> <li><math>\alpha^* &lt; 1</math> for <math>1 &lt; y \leq \tilde{y}</math>, either full separation or some pooling if <math>\bar{y} &lt; y \leq \tilde{y}</math></li> <li><math>\alpha^* = 1</math> and full separation for <math>y \geq \tilde{y}</math></li> </ul>
$x > 1$	<ul style="list-style-type: none"> <li><math>\alpha &lt; 1</math> nonprofit</li> <li>Pooling and volunteerism</li> </ul>	<ul style="list-style-type: none"> <li><math>\alpha^* &lt; 1</math> nonprofit</li> <li>Pooling and volunteerism</li> </ul>	<ul style="list-style-type: none"> <li><math>\alpha^* &lt; 1</math>, pooling and volunteerism when <math>x</math> is high w.r.t. <math>y</math></li> <li><math>\alpha^* = 1</math>, full separation when <math>x</math> is low w.r.t. <math>y</math></li> </ul>

The main driver of the results contained in Corollary 1 is the concavity of the mission-motivation function  $\gamma(\alpha)$ . Indeed, when the fraction of compensated care  $\alpha$  is high enough, a further increase in the fraction of revenues retained by the hospital generates a sharp drop in workers' motivation; this is harmful for the hospital because it causes a sizable decrease in health professionals' willingness to donate work and a corresponding increase in salary, leading to lower expected payoffs.

A natural question then arises as to which particular mission-motivation function one should expect to observe in real-world situations. According to Besley and Ghatak (2018, p. 429) and to a decreasing marginal returns argument, it is reasonable to imagine that, starting from a situation with no revenue penalization, that is,  $\alpha = 1$ , and introducing a little investment in charity care policies, the hospital might increase significantly the pro-social motivation of its prospective workers. A further increase in the hospital's uncompensated care (i.e., a further reduction in  $\alpha$ ) should still increase health professional's motivation to work, but to a lesser extent. This suggests that the mission-motivation function should be concave, at least for sufficiently high levels of  $\alpha$ . Therefore, the most relevant cells in Table 2 should be those which are close to the bottom-left corner. Associated to these cells, hospitals have a positive level of mission-orientation which makes them choose the nonprofit status and induces volunteer work on the part of the least-skilled health professionals.

#### 4 | CONCLUSION

I analyze the screening problem of a hospital that hires motivated workers who have private information about their ability and are limitedly liable. Given the optimal contract, it becomes natural for the hospital to choose its mission-orientation in such a way as to enhance the level of motivation for its pool of applicants.

It is shown that the hospital can induce the desired level of motivation in its prospective employees by way of strategically selecting whether and how much to invest in charity care provision. Given that highly motivated workers are ready to work harder for their employer while accepting lower wages, the hospital optimally trades off the costs of investing in a highly demanding mission (i.e., sacrificing a high fraction of its payoffs) with the benefits from hiring a highly motivated and cheaper workforce. In some circumstances, the maximization of the hospital's own payoffs is well aligned with the attainment of charitable goals and with the employment of volunteer labor.

This paper provides a new rationale for the emergence of different organizational cultures (pure for-profits or private nonprofits which might rely on volunteer work) within institutions that produce goods or services having a social component. Such organizations stand as an alternative to government provision, and have recently received attention by the literature. Moreover, this paper rationalizes the observed variation in the degree of charity care adopted by different nonprofit providers. The driving mechanism would be that different hospitals are faced with different pools of potential applicants, have different beliefs about workers' mission preferences and therefore have heterogeneous expectations about which mission-motivation function is relevant.

Related to the last remark, observe that, although the model does not display crowding-out effects, there is a cross-sectional implication that looks similar to this. Suppose, again, that there are different hospitals that face different mission-motivation functions and thus employ workers with different levels of motivation. Workers with higher motivation will be offered lower incentive pay in exchange for the provision of higher effort. Thus, at an aggregate level, higher compensations will be associated with lower effort levels, even though the relationship is not causal.

## ACKNOWLEDGMENTS

I am grateful to Arsen Palestini, Ester Manna, seminar participants at Universidad de Barcelona, the audiences at SED Conference (Budapest, 2019), UECE Lisbon Meetings (Lisbon, 2019) and ASSET Meeting (Athens, 2019) for their constructive comments and discussion. The usual disclaimer applies. The financial support from Alma Mater Studiorum Università di Bologna, grant ALMAIDEA\_2017 No. 24042 is gratefully acknowledged.

Open Access Funding provided by Università di Bologna within the CRUI-CARE Agreement.

## CONFLICT OF INTEREST

The authors declare no conflict of interests.

## DATA AVAILABILITY STATEMENT

Data sharing is not applicable as this article describes entirely theoretical research.

## ORCID

Nadia Burani  <https://orcid.org/0000-0001-7111-4302>

## ENDNOTES

- <sup>1</sup> See Chau and Huysentruyt (2006) and Besley and Ghatak (2005, 2017, 2018).
- <sup>2</sup> More precisely, non-government nonprofit hospitals represent 58% of all registered community hospitals, followed by investor-owned for-profit providers and by state and local hospitals, accounting for 21% each. See Nolte et al. (2014) and Barros and Siciliani (2012).
- <sup>3</sup> Charitable nonprofit hospitals are eligible for federal tax-exempt status. In the tax code, however, there is no explicit definition for the term “charitable”, so, over the years, different standards have been developed to determine whether a nonprofit hospital qualifies as a charitable organization. In 1956, the *Charity Care Standard* was introduced, which required the hospital to provide free or reduced-cost care to patients unable to pay for it. It was amended in 1969 (shortly after the enactment of Medicare and Medicaid) by the less restrictive *Community Benefit Standard*, according to which a nonprofit hospital is charitable if it is organized for the purpose of promoting health in its community. For instance, operating an emergency room open to all, regardless of ability to pay, is in accordance with this standard. More recently, the *Patient Protection and Affordable Care Act*, effective from 2016, introduced the following new requirements: (i) having a written charity care policy and a separate written emergency medical care policy; (ii) charging patients who are eligible for charity care no more than amounts generally billed to insured or Medicare patients; and (iii) not using extraordinary debt collection practices from patient eligible for charity care. See <https://www.irs.gov/charities-non-profits/charitable-hospitals-general-requirements-for-tax-exemption-under-section-501c3>.
- <sup>4</sup> See Congressional Research Service Report #34605 at <https://www.everycrsreport.com/reports/RL34605.html>.
- <sup>5</sup> The human resource management literature has recently started to acknowledge that motivation is a desirable workers' characteristic, because of the ‘donative-labor hypothesis’ (Preston, 1989). Indeed, motivated workers are willing to exert more effort, or produce higher-quality output, and require less monetary compensation. There is quite a rich experimental evidence testing the hypothesis that firms' pro-social initiatives increase employees' effort and can be used as a substitute for monetary incentives (Burbano, 2016; Cassar, 2019; DellaVigna & Pope, 2018; Imas, 2014; Tonin & Vlassopoulos, 2010).
- <sup>6</sup> Using data from health professionals in Ethiopia, Serra et al. (2011) test whether workers are differently motivated according to the mission of the employing organization. The authors measure pro-social motivation through survey questions, asking health professionals to rank several job characteristics (‘opportunity to help the poor’ being one of them) according to their importance. They find that pro-social motivation is positively associated with working in the nonprofit health sector, which has a clear mission, that is, serving the poor and vulnerable, as opposed to the for-profit sector which aims at maximizing profit by providing care only to those able to pay.
- <sup>7</sup> At most, worker motivation is conceived as changing in accordance with the nature of the provider, with the same worker being motivated when employed in a mission-oriented nonprofit organization, or not motivated at all when employed by a strict profit-seeking firm. See Delfgaauw and Dur (2008, 2010) and Barigozzi and Burani (2016b, 2019), among others.
- <sup>8</sup> An exception is Cassar and Armouti-Hansen (2020) that studies optimal contracting with endogenous project mission.
- <sup>9</sup> See also Barigozzi and Turati (2012) for the selection effects of a fixed wage offered to nurses who are heterogeneous and privately informed about their ability and their vocation.
- <sup>10</sup> See also Francois (2000) and Murdoch (2002) for similar outcomes.
- <sup>11</sup> I do not review here the rich empirical literature on the effects of hospitals' market and ownership structure on hospital performance, measured in terms of quality of care, productive efficiency, treatment choice, uncompensated care and so forth.
- <sup>12</sup> Thus, the wage differential between for-profit and nonprofit firms is entirely driven by motivated workers sorting into the non-profit sector. This finding is in line with the empirical evidence provided by Jones (2015) who tests the donative-labor hypothesis focusing on the nursing home industry.

- <sup>13</sup> Delfgauw and Dur (2008) also focus on worker sorting between public and private sector when employees are heterogeneous with respect to both motivation and laziness. Furthermore, Dur and Zoutenbier (2014) use questionnaire data from the German Socio-Economic Panel Study and find that public sector employees are significantly more altruistic and lazy than private sector employees, especially within the caring industries.
- <sup>14</sup> Similar objective functions can be found in Barigozzi and Burani (2016b, 2019).
- <sup>15</sup> There is no consensus in the literature as to whether nonprofit hospitals behave differently than for-profit organizations and have different objective functions. Newhouse (1970) postulates that nonprofit hospitals maximize both quantity and quality of services subject to a balanced budget. Conversely, Pauly (1987), Weisbrod (1988) and, more recently, Rosko et al. (2020) believe that organizational differences turn out to be much less important than they might seem. Indeed, if a provider has higher revenues from production or lower labor costs, then more funds become available for other purposes. This becomes particularly relevant for nonprofit hospitals that run their operations on rather tight budgets (Cunningham et al., 2008). See also the empirical analysis of Deneffe and Masson (2002) which rejects the hypotheses that nonprofit hospitals maximize profits or pure welfare (output).
- <sup>16</sup> This is reminiscent of Glaeser and Schleifer (2001) and Ghatak and Mueller (2011), where for-profits fully realize their profits as income, whereas nonprofits are able to appropriate only a fraction of their profits in the form of perquisites.
- <sup>17</sup> Notice that the hospital's objective function assumes away other important institutional and regulatory aspects, namely nonprofit tax exemptions and tax-deductible donations. Adding these elements into the model would reinforce the results obtained, in the sense that it would make the hospital even more inclined to choose the nonprofit status and engage in charity care.
- <sup>18</sup> Throughout the paper, I will refer to either  $\gamma e$  or simply  $\gamma$  as worker motivation, hoping that no confusion arises.
- <sup>19</sup> The assumption that motivation is observable might not be very realistic: hospitals often wish to recruit the most motivated health professionals to perform important tasks, and many providers have elaborate recruitment processes for selecting people with high pro-social credentials. However, considering incentive schemes that achieve worker self-selection according to motivation, rather than ability, would not deliver the desired results. In particular, more motivated workers would be paid more than less motivated colleagues in order to elicit their private information about motivation. So, liability limitations would not be relevant and neither pooling nor volunteerism would emerge as contractual outcomes. See Barigozzi and Burani (2016a, 2016b), that analyze alternative environments in which either motivation is heterogeneous and unobservable whereas ability is homogeneous and observable, or else ability and motivation are both heterogeneous and unobservable to the principal.
- <sup>20</sup> See the version written in 1964 by Louis Lasagna, Academic Dean of the School of Medicine at Tufts University, at <https://www.pbs.org/wgbh/nova/article/hippocratic-oath-today/>.
- <sup>21</sup> The experimental literature has studied the dependence of worker motivation on employer's mission, but mostly in line with Besley and Ghatak (2005) as a matter of matching the mission preferences of workers and firms. See Fehrler and Kostfeld (2014), Gerhards (2015), Carpenter and Gong (2016) and Cassar (2019). See also Banuri et al. (2018) for an attempt to disentangle task versus mission motivation of medical students in Burkina Faso.
- <sup>22</sup> Notice that this interpretation of worker motivation is informationally less demanding than a simple task preference for being involved in charity care rather than regular care, because it does not require health professionals to be able to tell apart insured patients and patients qualifying for charity care (at emergency departments, for instance, this would be rather difficult). The foundations of worker motivation are further discussed in Section 3, where the mission-motivation function is introduced.
- <sup>23</sup> See also Besley and Ghatak (2018), who state that setting  $w < 0$  may not be an option if the agent has limited wealth. Capital markets would not help, because additional agency problems between the agent and the lender would emerge.
- <sup>24</sup> There are other mechanisms that could affect employees' motivation, that include reciprocity and signaling of owners' or managers' altruism (as in David & Levine, 1998; Non, 2012), which I do not consider in this analysis.
- <sup>25</sup> There is also some experimental evidence supporting the hypothesis that increased employee motivation stems from employers' stronger preference to spend resources for a social cause (Kajackaite & Sliwka, 2020). Moreover, the experiment by Koppel and Regner (2019) shows that the full potential of 'motivation by mission' is realized only when principals share and support their workers' values, stressing the importance of identity aspects in labor market settings.
- <sup>26</sup> To be precise, let  $A$  be a continuous random variable defined on the bounded interval  $[0, 1]$ ; the survival function provides the probability that random variable  $A$  takes values above a given level  $\alpha$ , namely

$$S(\alpha) = \Pr(A > \alpha) = \int_{\alpha}^1 f(a) da,$$

with  $f$  being the probability density function. The survival function is also known as the complementary cumulative distribution function because  $S(\alpha) = 1 - F(\alpha)$  where  $F$  is the cumulative distribution function.

- <sup>27</sup> The interested reader is referred to Appendix A.2.2 in supporting information S1, where the characteristics of the Kumaraswamy distribution are presented for different parameter values, and related to other (more familiar) continuous probability distributions defined on a bounded support.
- <sup>28</sup> The reader is referred to Appendix A.2.3 in supporting information S1 for a series of examples that provide the flavor of the analysis performed.

<sup>29</sup> Notice that qualitatively the same results would be obtained if charity care were modeled as a fixed amount of resources spent by the hospital rather than as a fraction of revenues.

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**How to cite this article:** Burani, N. (2021). No mission? No motivation. On hospitals' organizational form and charity care provision. *Health Economics*, 30(12), 3203–3219. <https://doi.org/10.1002/hec.4431>