

# PROFIT SHARING AND THE ROLE OF PROFESSIONAL PARTNERSHIPS\*

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When it is hard to assess service quality, firms will suboptimally hire low ability workers. We show that organizing as a profit-sharing partnership can alleviate these problems. Our theory explains the relative scarcity of partnerships outside of professional service industries such as law, accounting, medicine, investment banking, architecture, advertising, and consulting. It also sheds light on features of partnerships such as up-or-out promotion systems, the use of noncompete clauses, and recent trends in professional service industries.

## I. INTRODUCTION

Modern economies exhibit a wide diversity of organizational forms. A striking puzzle in this regard is the distribution of partnerships relative to corporations across industries. While the corporate form dominates across manufacturing, technology, and many service industries, partnerships have been prominent in human-capital-intensive professional services such as law, accounting, investment banking, management consulting, advertising, and medicine.

In this paper we investigate an economic rationale for profit-sharing partnerships and their presence in the professional services. We take the defining feature of a partnership to be redistribution of profits among the partners.<sup>1</sup> Profit sharing leads individuals to be particularly selective as to whom they take on as partners. This feature of partnerships assures clients of quality service. We show that as a result, if clients are concerned about

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1. Aside from being a natural lay definition of partnership, our focus on profit sharing is loyal to the Internal Revenue Service code. A partnership's tax returns must show the names and addresses of each partner and each partner's *distribution share* of income. An alternative and complementary view of partnerships would start with the allocation of control rights [Hart and Moore 1996]. Interestingly, however, a joint undertaking merely to share expenses over jointly owned assets, or co-ownership of property that is maintained and leased, or rented, would not qualify as a partnership under the tax code (see IRS package 1065).

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quality and are in a relatively poor position to assess quality, then partnerships tend to be a preferable mode of organization relative to a profit-maximizing corporation.

Our model suggests that partnerships will emerge under some market conditions but not others. In particular, the theory predicts that partnerships will emerge when human capital plays a central role in determining product quality and when clients are at a disadvantage relative to firms in assessing the ability of employees. In our view, these conditions aptly characterize the professional services, but are a much worse description of manufacturing or technology industries where partnerships are quite unusual.

Section II presents a simple model that focuses on the hiring policies of a monopoly firm. The firm faces a distribution of heterogeneous workers in the labor market and the ability of the employees who are hired determines the quality of the firm's product. We assume that a corporation makes decisions with the intention of maximizing profits, while an equal-sharing partnership would like to maximize profits per partner. As was first observed by Ward [1958], a partnership is relatively less inclined to expand its labor force in comparison to a corporation. Intuitively, existing partners hesitate to bring in new partners unless they raise the average partner share, and as a result, partnerships may pass up hires whose marginal contribution to total profits is positive. Given the distribution of talent in the labor market, this selectivity translates into a higher quality threshold for employment, resulting in a higher quality product. Our model uses the simplification of equal-sharing within the partnership, but the conclusion that partnerships will be more selective than corporations extends to a much broader class of sharing rules.

Into this simple model of organizational decision-making, we incorporate the possibility that clients may not be able to perfectly perceive product quality. We show that when there are no problems with market monitoring, a profit-maximizing corporation hires efficiently while profit-sharing partnerships are too selective. With less effective market monitoring, however, both corporations and partnerships are tempted to reduce quality and hire less able workers, hoping to benefit in the event that the market does not discern this loss of quality. Corporations consequently move away from efficient production as market monitoring deteriorates, generating less profits, but partnerships move closer to efficient hiring (though profits *per partner* decrease).

This leads to our main result: if market monitoring is sufficiently reliable, corporations perform better than profit-sharing partnerships, while if market monitoring is weak, partnerships are strictly more profitable than corporations.

Section III generalizes our analysis to an environment in which market structure, wages, and organizational form are determined in equilibrium. As in our single-firm model, profit-sharing partnerships are more efficient when market monitoring is sufficiently imperfect. Competitive market pressure gives rise to a new effect, where entering firms may try to pick off the best workers at an incumbent firm. We show that competitive pressure can favor firms that are able to retain top employees, even if they are not organized in the way that would be most profitable in the absence of competition. We also argue that adopting productivity-based compensation can be one way for partnerships to retain top employees in the face of competition.

Our theory generates a variety of implications for the structure of partnerships. In Section IV, we show how common features of partnerships such as up-or-out promotion systems and noncompete clauses can be interpreted as part of a partnership's quality commitment mechanism. We also consider how physical capital requirements or wealth limitations of prospective partners might favor a corporate form. Finally, we use our market equilibrium analysis to connect the model with some recent trends away from the traditional partnership structure in investment banking and law.

At its heart, our theory involves two key claims. The first, which seems noncontroversial, is that employee quality is crucial for firms in human-capital-intensive industries. Evidence of this can be found on virtually any Web site of a top law or consulting firm. Almost invariably, these firms emphasize the excellence of their workforce and their efforts to recruit top candidates. The second claim of the theory is that the partnership form of organization provides a means to ensure employee quality. Some suggestive evidence can be found by considering case studies of professional service firms that have faced decisions about organizational form.

One example is Goldman Sachs, which went public in 1999 after entertaining and rejecting several earlier proposals for a public offering. Goldman Sachs had operated successfully as a partnership for over a century, but ultimately its partners decided that the benefits of operating as a partnership were out-

weighed by the need to raise additional capital.<sup>2</sup> During internal debates prior to the public sale, many partners emphasized that dissolving the partnership might undermine the firm's quality and reputation. Endlich [1999, p. 255] paraphrases Henry Paulson, a cosenior partner who advocated for the public offering, "[t]he partnership has allowed Goldman Sachs to recruit and keep the best talent in the industry; the firm's culture rests on the foundation of its partnership, which has allowed Goldman Sachs to differentiate itself from other firms; public owners have a different agenda from partners, and are not known to be 'long-term' greedy." The concerns expressed by Paulson resonate well with the key issues of our theory. Hiring and retaining top employees is central, outside owners may not have the objectives that conform to this need, and remedies can be found in the partnership form of organization.<sup>3</sup>

A less recent example can be found in the evolution of Booz Allen Hamilton, one of the leading management consulting firms. In 1970 Booz Allen dissolved its partnership and went public, only to buy back the shares and become a private partnership again six years later. According to *Business Week* (December 1, 1975), "when Booz Allen went public, it appeared it might be a trend-setter among consulting firms. But before long earnings and the market began to erode, and service companies lost their allure among investors." While there is no direct evidence on quality (as opposed to earnings) during its period as a public company, the fact that Booz Allen decided to return to private ownership suggests that insiders realized the potential gains from operating as a partnership.

2. Most of Goldman Sachs' leading competitors converted away from the partnership form earlier, in the 1980s, generally motivated by the prospect of raising capital. We discuss this transition and how it relates to our model in Section IV.

3. As a supplemental anecdote, a former employee of Goldman Sachs offered the following review of Endlich's book on Amazon.com: "There was a clear change in the firms' culture after the greedy portion of the 1980's. The author is right on the mark when she tells how important the people (not only the partners) were to the creation of the special atmosphere that pervaded the firm and how very special it was to be a part of it. Although profitability was always a clear motive, it surely was not the sole purpose for which the firm existed. To profile a few bond traders and enumerate their spectacular successes (and failures) in the 1990s clearly indicates how things have changed from previous decades. I worked with Gus Levy for 10 years and Bob Rubin for 20 years and from a trader's point of view these were the spectacular people at least in the Equities Division. I doubt that the client interest is foremost in the culture of Goldman Sachs today as it was for the first 125 years. Although the importance of the client remains high today, it is profitability and risk taking that are the motivating forces."

The literature does not offer a commonly accepted reason for why partnerships are observed in some industries but not others. Alchian and Demsetz [1972] focus on the incentive problems created by joint production. They argue that internal monitoring problems will cause professional service firms to shy away from organizing as capitalist corporations. Hansmann [1996] argues against this incentive hypothesis, suggesting that other factors such as collective decision-making are more important in determining the distribution of employee ownership.<sup>4</sup>

Our theory departs from the incentive view by emphasizing the effect of profit sharing on the *selection* of employees rather than on their *motivation*. The model does allow a role for informational imperfections, but the monitoring problem is *between* the firm and prospective clients rather than *within* the firm.<sup>5</sup> Our emphasis on assembling talented employees is consistent with the view that financial compensation is just one aspect of motivation, and implicit incentives, reputation, and social pressure may be able to substitute for direct productivity-based pay in some cases.<sup>6</sup>

Finally, our paper relates to the literature on the organizational role of nonprofit firms. Hansmann [1980] suggested that "contract failure" is a primary reason for nonprofit firms, as they soften the incentives of managers to expropriate rents when these can easily be diverted. This idea has been demonstrated formally by Easley and O'Hara [1983] and Glaeser and Shleifer [2001]. Easley and O'Hara take the view that the organization which maximizes social surplus will emerge because society is treated as a planner. Glaeser and Shleifer have an approach more in line with ours, as they show how organizing as a nonprofit can act as

4. Hart and Moore [1996] and Kremer [1997] develop formal models in which majority voting leads to inefficiency in consumer- and worker-owned firms, respectively.

5. Garicano and Santos [2004] suggest an incentive role for profit sharing that is complementary to ours. They argue that incentives to allocate client work efficiently within a diverse group of partners are provided by the profit-sharing feature of partnerships. Morrison and Wilhelm [2004] also suggest an incentive role for profit sharing that focuses on mentoring and on-the-job training.

6. See Kandel and Lazear [1992] on peer pressure as a solution to the free-rider problem studied by Holmstrom [1982] and others. One also can imagine other stories apart from incentives and selection for the presence of partnerships. For example, Miyazaki [1984] argues that labor-managed firms do a better job of insuring employees against job loss. Another possibility is that some individuals simply prefer organizing as a partnership. Both of these stories seem unlikely to explain the cross-sectional distribution of organizational form that we are attempting to explain.

a commitment not to divert funds and hence to provide higher quality service to donors.

## II. MONOPOLY WITH EXOGENOUS WAGES

Our view is that organizational form is chosen to maximize the equilibrium profits of an organization. A justification for this is basic arbitrage. If a partnership existed, but a corporation would generate more profits, an entrepreneur would be willing to buy out the partnership and convert it to a corporation. Conversely, if a corporation existed, but a partnership would generate higher profits, a group of workers would be willing to buy out the owners of the corporation and convert the firm to a partnership.

We begin our analysis with a simplified monopoly model in which employee wages are exogenously fixed. This results in a stark and clear comparative analysis of organizational form. In Section III we develop a competitive market equilibrium model that demonstrates the robustness of our comparative results, and offers some additional insights into the equilibrium choice of organizational form.

### II.A. Technology, Preferences, and Information

Consider a continuum of workers, of unit measure, whose abilities are distributed on the interval  $[\underline{a}, \bar{a}]$  with distribution  $F(\cdot)$  and positive density  $f(\cdot)$ . Each worker has access to an outside labor market that pays a fixed wage  $w \in (\underline{a}, \bar{a})$ , independent of ability. As we show in the next section, the constant wage simplifies the analysis, but is not crucial to the main comparative static results.

The workers have access to a production technology that requires labor and a fixed capital cost  $K > 0$ .<sup>7</sup> If a (measurable) set  $A$  of workers is employed, the firm can produce a quantity  $|A|$  of services, equal to the probability measure of  $A$ . A firm's quality of service equals the average ability of workers in  $A$ :

$$q(A) = \frac{1}{|A|} \int_{\bar{a} \in A} \bar{a} f(\bar{a}) d\bar{a}.$$

7. This is a simple way of introducing increasing returns, a necessary condition for group production to dominate individual production. Other forms of increasing returns would suffice to yield our results.

The market for the firm's services is composed of a large number of identical clients. Each values the firm's services at the expected quality of service. Thus, if the market knows that the firm has employed a set  $A$  of workers, willingness to pay is equal to

$$p(A) = q(A).$$

For many products, and certainly most professional services, consumers do not have perfect information about quality. We incorporate this informational asymmetry by assuming that the market observes the firm's quality only with probability  $\mu$ . With probability  $1 - \mu$ , the market cannot assess quality and instead forms an expectation over the set of employees, denoted by  $A^e$ . Thus, depending on the market's information, the price commanded by the firm is either  $p(A)$  or  $p(A^e)$ .

This simple formulation of information abstracts from important issues of signaling or reputation formation. Nevertheless, it captures the fundamental idea from such models that demand should depend both on the firm's actual choices and on the market's beliefs about these choices. When  $\mu$  is higher, demand tracks more closely the firm's actual choices as opposed to the market's beliefs. We thus interpret  $\mu$  as a measure of informational efficiency or market monitoring.

When choosing employees, the firm faces an expected price:

$$\mu p(A) + (1 - \mu)p(A^e).$$

If the firm hires the set  $A$ , it will be able to sell a quantity  $|A|$  of services irrespective of market monitoring.

To benchmark the analysis, consider the firm's economic profits (revenues net of capital costs and employees' opportunity wages) when clients pay a price equal to the average quality (which will occur in equilibrium):

$$\Pi(A) = \int_{a \in A} (a - w) f(a) da - K.$$

Economic profits are maximized by employing all workers with abilities  $a \geq w$ . To make the analysis interesting, we assume that if the firm makes first-best efficient hiring decisions and employs the set  $A^{FB} = [w, \bar{a}]$ , then  $\Pi(A^{FB}) > 0$ . We also assume that if

the firm simply hires every worker, it will make negative economic profits; i.e.,  $\Pi([\underline{a}, \bar{a}]) < 0$ .<sup>8</sup>

Timing is as follows. Given the choice of organizational form, the market forms an expectation  $A^e$  of who will be employed. The firm then makes hiring decisions (selects  $A$ ), which the market learns with probability  $\mu$ . Finally, the price is set, and the firm produces. We consider the *perfect Bayesian equilibrium* (PBE) for both a corporation and a partnership, and then consider the optimal choice of organizational form.

### II.B. Corporation Equilibrium

A corporation makes hiring decisions to maximize expected profits. As workers command the same outside wage, and the expected price that the firm can charge is increasing in the quality of its employees, it is easy to see that a corporation will select the most qualified workers. Thus, the firm's optimal hiring strategy is to choose a threshold  $a$  and employ workers with abilities above  $a$ .

Slightly abusing our previous notation, denote quality with threshold  $a$  as

$$(1) \quad q(a) = \frac{1}{1 - F(a)} \int_a^{\bar{a}} \tilde{a} f(\tilde{a}) d\tilde{a},$$

while quantity is  $1 - F(a)$ . Similarly, let  $p(a)$  denote the price if the market is informed about the threshold  $a$ , and  $p(a^e)$  the price if the market has a threshold conjecture  $a^e$ .

Given beliefs  $a^e$ , the firm chooses its hiring threshold  $a$  to maximize expected profits:

$$\pi(a, a^e) = [1 - F(a)][\mu p(a) + (1 - \mu)p(a^e) - w] - K.$$

The first-order condition for optimal hiring is that  $a$  satisfy

$$\mu a + (1 - \mu)p(a^e) = w.$$

That is, a corporation optimally hires up to the point where the *expected* marginal product of the worker being hired is exactly

8. It is not important that  $\Pi([\underline{a}, \bar{a}]) < 0$ . Discarding this assumption means that both forms of organization will always be profitable, but our central results remain intact.



equal to the wage. As the marginal product of each successive employee is decreasing, the hiring optimum is unique.<sup>9</sup>

In a PBE the market will correctly anticipate the firm's hiring choice. If  $a$  is the firm's hiring threshold, then in equilibrium,  $p(a^e) = p(a)$ . Combining this with optimization yields the corporation's unique equilibrium hiring threshold  $a^C$ :

$$(2) \quad \mu a^C + (1 - \mu)p(a^C) = w.$$

There is a natural relationship between market monitoring and equilibrium hiring. With perfect monitoring ( $\mu = 1$ ), profit maximization dictates efficient hiring:  $a^C = a^{FB} = w$ . As monitoring becomes less effective, the firm internalizes less of any drop in quality, leading to a lower equilibrium hiring threshold  $a^C < a^{FB}$ , and lower quality.

If it should choose to operate, the corporation's equilibrium profits will be

$$\pi(a^C, a^C) = \Pi(a^C) = \int_{a^C}^{\bar{a}} (a - w) dF(a) - K.$$

The corporation will want to operate in equilibrium if and only if  $\Pi(a^C) > 0$ .

### *II.C. Partnership Equilibrium*

We define a partnership as an organization in which profits are shared equally among its members. As we discuss below, equal sharing per se is not necessary for our results, but some form of redistribution is.

If the market's expectation of hiring is  $A^e$ , and a partnership is formed with a set  $A$  of partners, each partner obtains an equal share per partner given by

$$s(A, A^e) \equiv \mu p(A) + (1 - \mu)p(A^e) - \frac{K}{|A|}.$$

The first two terms are the price per unit of labor; the last term represents the capital cost divided among the partners.

9. To derive the first-order condition, first substitute  $q(a)$  as defined in (1) for  $p(a)$  in the expression for profits. Then  $\pi_a(a, a^e) \equiv f(a)[- \mu a - (1 - \mu)p(a^e) + w] = 0$ . Because  $\pi(a, a^e)$  is strictly quasi-concave in  $a$ , it has a unique maximum. Note that if  $\mu$  is sufficiently low, or if beliefs are sufficiently optimistic, the first-order condition may not hold for any  $a \in [a, \bar{a}]$ . In this case, the unique solution is the corner solution  $a = \underline{a}$ .

Given that the market price decreases in quality, and that workers have a uniform outside option  $w$ , it seems reasonable that a partnership will choose a partnership threshold in the same way a corporation chooses an employment threshold. To obtain such a characterization, we introduce the notion of *stability*. A stable partnership satisfies two natural requirements: First, individual rationality suggests that partners should get a share of profits that exceeds their opportunity cost  $w$ . Second, the partners should not want to dismiss any current partners or admit additional partners.

**DEFINITION 1.** A partnership  $A \subset [\underline{a}, \bar{a}]$  is *stable* if  $s(A, A^e) \geq w$ , and there do not exist small  $\varepsilon, \delta \geq 0$  such that a mass  $|A| - \varepsilon$  of partners benefit by replacing a mass  $\varepsilon$  of members with a mass  $\delta$  of nonmembers, each of whom is willing to join.

A straightforward argument shows that the only stable partnership will be the interval of workers  $[a, \bar{a}]$  that achieves the maximum share per partner, subject to this share being above  $w$ .<sup>10</sup> Therefore, given market beliefs (and allowing for a slight abuse of notation as before), the stable partnership solves

$$\max_{a \in [\underline{a}, \bar{a}]} s(a, a^e) = \mu p(a) + (1 - \mu)p(a^e) - \frac{K}{1 - F(a)}.$$

The first-order condition for optimal hiring is

$$\mu a + (1 - \mu)p(a^e) = \mu p(a) + (1 - \mu)p(a^e) - \frac{K}{1 - F(a)}.$$

The partnership hires up to the point where the marginal product of the last member is equal to the average profit share of the members already hired. As for the corporation, there is a unique optimum.<sup>11</sup>

Combining partnership optimization with equilibrium beliefs

10. The key to seeing this is the following. If workers of ability  $a$  are included but those of ability  $a' > a$  are not, then all partners other than those of ability  $a$  would prefer to replace some or all of the partners of ability  $a$  with new partners of ability  $a'$ . This raises the share per partner, so if agents were willing to participate in the earlier partnership, they will be willing to participate in the later one. This establishes that any stable partnership must be an interval  $[a, \bar{a}]$ . If all partners of ability  $a' > a$  could increase their share from dropping those of the lowest ability, they would choose to do so.

11. As with corporation profits, the share  $s(a, a^e)$  is strictly quasi-concave in  $a$ , and the solution is unique. If  $\mu$  is sufficiently low, then it may be optimal for the partnership to choose  $\underline{a}$ .

yields an expression for the partnership's unique equilibrium hiring threshold  $a^P$ :

$$(3) \quad \mu a^P + (1 - \mu)p(a^P) = p(a^P) - \frac{K}{1 - F(a^P)}.$$

Again, there is a clear relationship between market monitoring and hiring. As for a corporation, worse monitoring leads to a decrease in the hiring threshold.

The partnership will be viable only if its economic profits are nonnegative, or

$$(4) \quad \Pi(a^P) = [1 - F(a^P)] \cdot [s(a^P, a^P) - w] \geq 0.$$

### II.D. Comparative Analysis

Our first result compares the hiring incentives of a corporation and a partnership. (The formal proofs of all propositions appear in the Appendix.)

**PROPOSITION 1.** For any market information  $\mu \in [0,1]$ , and any market beliefs that allow positive profits, a corporation chooses a lower hiring threshold than a partnership.

Proposition 1 has a natural logic that echoes Ward's [1958] analysis. If adding a given worker increases the average profit *per employee*, then adding that worker must strictly increase total profits. It follows that whatever hiring threshold a partnership sets, a corporation prefers a lower threshold.

This argument, which is central to our distinction between profit-sharing partnerships and wage-paying corporations, does not rely on partnerships sharing profits equally. Any profit-sharing rule that redistributes profits from high quality employees to marginal employees will raise hiring quality relative to a corporation that pays its marginal employees their reservation wage.

Our next result shows that the logic of the firm's optimization problem carries over to the equilibrium problem. It also states that corporations and partnerships will make identical shutdown decisions in equilibrium. This is easy to see because when the maximum total profits are zero or negative, so are the maximum average profits, and vice versa.

**PROPOSITION 2.** There is some  $\underline{\mu} \in (0,1)$  such that if  $\mu \leq \underline{\mu}$  neither a corporation nor a partnership could be profitable in equilibrium. If  $\mu > \underline{\mu}$ , both could be profitable, and the corpora-

tion sets a strictly lower equilibrium hiring threshold,  $a^C < a^P$ .

We are now ready to state our central comparative static result. Observe that as market monitoring becomes worse, i.e., as  $\mu$  decreases from 1 toward  $\underline{\mu}$ , then both the corporation and the partnership have lower equilibrium quality. For the corporation,  $a^C$  decreases from  $a^{FB}$ , while firm profits  $\Pi(a^C)$  decrease from first-best to zero. For the partnership,  $a^P$  also decreases, but starting from a point above  $a^{FB}$ , so firm profits  $\Pi(a^P)$  first increase and only then decrease toward zero. The implication is that for high levels of market monitoring corporations will outperform partnerships, while for low levels of market monitoring the reverse will be true.

**PROPOSITION 3.** There exists some  $\hat{\mu} \in (\underline{\mu}, 1)$  such that a partnership achieves strictly higher profits than a corporation if  $\mu \in (\underline{\mu}, \hat{\mu})$ , while a corporation achieves strictly higher profits than a partnership if  $\mu \in (\hat{\mu}, 1]$ .

### II.E. Discussion

Our comparative results rest on three key assumptions. First, there is a distribution of talent in the labor market, so that the selection of employees matters to clients. Second, the market has imperfect information about the firm's hiring decisions and the resulting quality of service. Finally, firms are able to commit to an organizational form of profit distribution, but are not able to make other commitments that affect employee selection, such as to hire only the most talented workers.

Given that wages are constant, the interplay of the first two assumptions can be tied neatly to the older literature on labor-managed firms and indeed, placed squarely in the context of standard monopoly theory. To see this, think of the firm as choosing a quantity  $x$  rather than a hiring threshold. Any quantity  $x \in [0, 1]$  has a corresponding threshold  $a(x) = F^{-1}(1 - x)$ . Let  $p(x) \equiv p(a(x))$  be the market price when the market observes  $x$ , and  $p^e$  be the price when the market does not and instead believes the hiring threshold is  $a^e$ . The firm's costs, in terms of quantity, are  $wx + K$ . Letting  $MR(x) \equiv \mu x + (1 - \mu)p(x)$  denote the *equilibrium marginal revenue*, we have a twist on the standard monopoly problem.

Figure I provides an illustration. For a corporation the equilibrium quantity  $x^C$  equates the equilibrium marginal revenue to

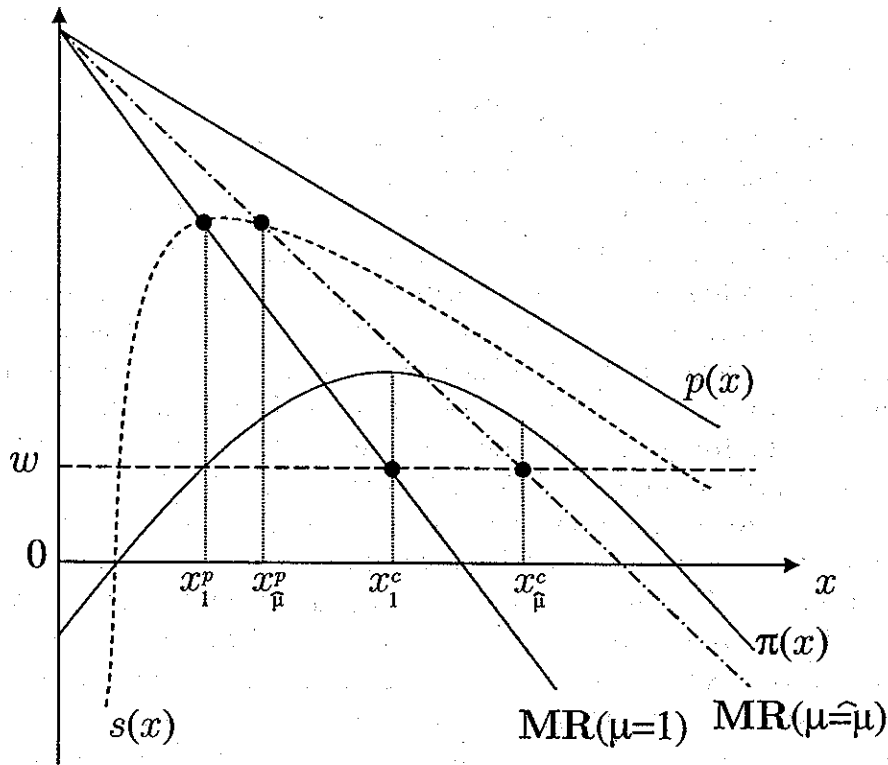


FIGURE I  
Graphical Illustration in Price/Quantity Space

the wage  $w$ . In contrast, for a partnership, the equilibrium quantity  $x^P$  equates the equilibrium marginal revenue to a partner's share. When  $\mu = 1$ , a corporation is efficient, while a partnership is inefficiently small (i.e., of inefficiently high quality). The equilibrium choices with  $\mu = 1$  are denoted in Figure I by  $x_1^C$  and  $x_1^P$ . This is precisely the problem studied by Ward [1958]—as he observed more than four decades ago, the corporation earns higher profits.

As  $\mu$  drops below one, both a corporation and a partnership choose higher quantities (lower qualities). Consequently, the partnership's *total profits* are first increasing toward the maximum, while the corporation's are decreasing. For some  $\hat{\mu}$  both organizational forms will generate the same total profits, and this is given by the quantities  $x_\mu^C$  and  $x_\mu^P$ , respectively. As  $\mu$  drops below  $\hat{\mu}$ , the partnership will be more profitable than the corporation, until the shutdown value of  $\mu$ . Thus, with imperfect market information the partnership's tendency toward being selective compensates for the firm's incentive to reduce quality. The

result is that a partnership is the more profitable form of organization.

This interpretation might convey the impression that a link between quality and quantity is essential to the theory, yet this is not the case. Section 3.3 in Levin and Tadelis [2004] shows that if wages depend on ability, similar results obtain despite the fact that quality and quantity are not directly tied in equilibrium. The idea is that a firm's profit per worker is the difference between the worker's marginal product and his outside option. Unless this gap is relatively large for high ability workers, the top-interval hiring property can fail, and the inverse relationship between size and quality is no longer maintained. A similar effect can arise in the market equilibrium model described in the next section.

The final assumption driving our results is that a partnership is, by definition, committed to share profits, while a corporation is not. The assumption that organizational form can be a commitment to operate in a certain fashion is broadly consistent with the theoretical literature on organizations, where organizational form is seen as a long-term decision, not frequently revisited, in contrast to hiring and production choices. It is important to emphasize, as pointed out above, that a commitment to share profits equally is not required. What is essential for the theory is a profit-sharing rule that redistributes at least some profits to marginal partners.

Of course, both in theory and practice, firms may be able to find alternative commitment mechanisms to ensure quality. In the context of our model, committing to pay every employee a wage  $w' > w$  would ensure a higher hiring threshold. This transfers some profits to the employees, but in some cases could be desirable. This is, in fact, profit sharing in another guise. More generally, committing to screen employees using some rigorous interview process, or committing to hire only applicants from top educational institutions, are also potential, though imperfect, ways to guarantee high quality. Indeed, in professional services we often see these strategies used in conjunction with profit sharing.

### III. COMPETITION AND MARKET EQUILIBRIUM

In this section we present a market equilibrium model in which organizational form, wages, and market structure are endogenously determined. In contrast to the monopoly model with

exogenous wages, competition for workers allows more talented employees to command higher salaries. A new effect is that in some cases competitive pressure can favor firms that are best able to retain top employees, even if these firms are not organized in the form that would be most profitable in the absence of labor market competition.

### III.A. A Simplified Model

We use a simplified version of our model with three types of workers. As before, there is a unit measure of workers with outside option  $w > 0$ . A proportion  $\pi_H$  have high ability  $a_H > w$ ; a proportion  $\pi_M$  have medium ability  $a_M \in (w, a_H)$ ; and a proportion  $\pi_L = 1 - \pi_H - \pi_M$  have low ability  $a_L < w$ . The technology, the demand for services, and market information are the same as before. Surplus is maximized when all high and medium ability workers are employed, and low ability workers are not. Thus, a firm that only includes high types has too high quality, and a firm that includes some low types has too low quality. Nevertheless, to allow for these possibilities in equilibrium, we assume that hiring only high types, or hiring all workers, are profitable configurations, and that the fixed costs are not so large that inefficiently small partnerships would necessarily want to admit more partners.

ASSUMPTION 1.  $\pi_H a_H + \pi_M a_M + \pi_L a_L - w - K > 0$  (hiring everyone is profitable);  $\pi_H(a_H - w) - K > 0$  (hiring only high types is profitable); and  $0 < K < \pi_H(a_H - a_M)$  (returns to scale are not too large).

As a starting point, it is useful to revisit the monopoly analysis with the simplified distribution of abilities. Assuming that only a single monopoly firm can form, Propositions 1–3 still apply. A corporation hires efficiently at  $\mu = 1$ , and progressively adds low types for lower values of  $\mu$ . A partnership hires only high types at  $\mu = 1$ , and adds medium and then low types as  $\mu$  drops.

PROPOSITION 4. In the three-type monopoly model, the partnership equilibrium is characterized by thresholds  $\mu^H > \mu^L$  such that if  $\mu > \mu^H$  the partnership includes only high types; if  $\mu \in [\mu^L, \mu^H]$ , it includes all high and medium types (i.e., it is efficient); and if  $\mu < \mu^L$ , all types are partners. The corporation equilibrium is characterized by thresholds  $\mu^{**} > \mu^*$ , such that if  $\mu \geq \mu^{**}$ , the corporation is efficient and includes

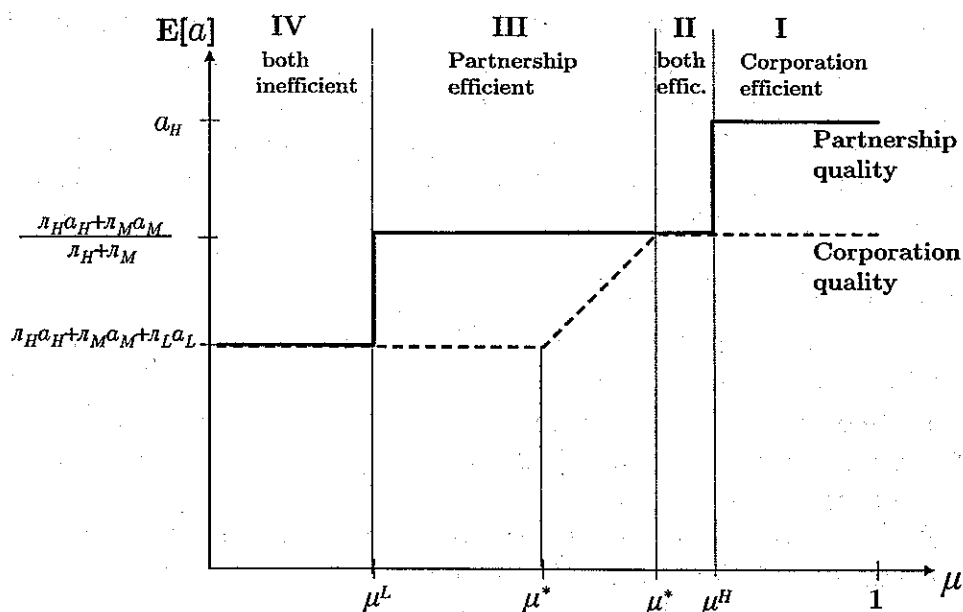


FIGURE II  
Partnership versus Corporation in a Three-Type Model

all high and medium types; if  $\mu \in (\mu^*, \mu^{**})$ , it also includes some (but not all) low types; and if  $\mu \leq \mu^*$ , all types are hired. Furthermore,  $\mu^L < \mu^*$ .

The proposition implies, as in our initial model, that an equilibrium partnership provides quality at least as high as a corporation; i.e.,  $\mu^L < \mu^*$ . In general, however,  $\mu^H$  and the corporation thresholds cannot be ranked. Figure II provides an illustration when  $\mu^H > \mu^{**}$ . There are four regions of interest. In region I,  $\mu > \max\{\mu^{**}, \mu^H\}$  so a corporation is efficient, and a partnership is not. In region II both forms are efficient. In region III a partnership is efficient, and a corporation is not. In region IV both forms are equally inefficient. If, in contrast to Figure II,  $\mu^H < \mu^{**}$ , there exist values of  $\mu$  for which a partnership is too selective, while a corporation is not selective enough.

### III.B. Free Entry Equilibrium

We now apply the three-type model to analyze a competitive free-entry equilibrium where both salaries and organizational form are determined endogenously. As before, partnerships will use equal sharing, and must be stable. Corporations can use any sharing rule, but cannot commit to pass up profitable hires, or to



pay an employee more than his marginal product. A key point is that with competitive entry a corporation will have to redistribute its profits in a form of salaries above the outside wage  $w$ .

Formally, a firm  $i$  is comprised of three components: the market belief about the firm's quality,  $p^i$ ; the fraction of each type of worker in the population that the firm hires:  $\lambda^i = (\lambda_L^i, \lambda_M^i, \lambda_H^i)$ , where  $\lambda_t^i \in [0, 1]$ ; and a type-dependent wage for each employee,  $w^i = (w_L^i, w_M^i, w_H^i)$ . Recall that  $w$  is the type-independent outside option. A *market structure* is a feasible collection of firms  $I$  satisfying  $\sum_{i \in I} \lambda_t^i \leq 1$  for all  $t \in \{L, M, H\}$ .

Our definition of equilibrium requires all firms to hire optimally given market beliefs and competing offers. To define optimal hiring, let  $MR_t^i = \mu a_t + (1 - \mu)p^i$  denote the marginal revenue of a worker of type  $t$  to firm  $i$ . For a corporation a worker of type  $t$  is a profitable hire if his marginal revenue is greater than any of his outside options, i.e.,  $MR_t^i \geq \max\{w_t^{-i}, w\}$ , where  $w_t^{-i}$  is the vector of wages at competing firms.

Optimal hiring for a corporation means that it makes all strictly profitable hires and no strictly unprofitable hires, and that if some workers of type  $t$  are hired (i.e.,  $\lambda_t^i > 0$ ), then  $MR_t^i \geq w_t^i \geq \max\{w_t^{-i}, w\}$ . Optimal hiring for a partnership is similar, only the wage is an equal share of the partnership's revenues net of fixed costs, and the condition for profitable hiring compares the marginal revenue from a prospective employee with the current profit share of employees.

**DEFINITION 2.** A market structure is a *free-entry Equilibrium (FEE)* if it satisfies

- (1) **Optimality:** Given  $w^{-i}$ ,  $w$ , and  $p^i$ , each firm  $i \in I$  hires optimally
- (2) **Correct beliefs:**  $p^i = q^i \equiv \mathbb{E}[a | (\lambda_L^i, \lambda_M^i, \lambda_H^i)] = (\lambda_L^i \pi_L a_L + \lambda_M^i \pi_M a_M + \lambda_H^i \pi_H a_H) / (\lambda_L^i \pi_L + \lambda_M^i \pi_M + \lambda_H^i \pi_H)$
- (3) **No Entry:** There is no potential entrant  $(\tilde{\lambda}, \tilde{w}, \tilde{p})$  satisfying (1) and (2) above that could make strictly positive profits.

Parts (1) and (2) are straightforward equilibrium requirements. Part (3) states that there does not exist a profitable opening for a new firm. A potential entrant must arrive with correct client beliefs, and its behavior must be a best response to these beliefs and the behavior of the existing firms. A subtle issue concerns the wages an entrant has to pay to attract existing workers. We follow standard static equilibrium analysis and as-

sume that to attract workers of type  $t$  from firm  $i$ , the entrant has to offer a wage of at least  $w_t^i$ .<sup>12</sup>

The fixed cost of production,  $K$ , generates increasing returns and implies that there can never be two corporations coexisting in a free-entry equilibrium. Whether or not there can be multiple partnerships in equilibrium depends on whether a firm composed only of medium type workers is profitable. The characterization of FEE is quite tedious when multiple partnerships are possible. For this reason we introduce Condition M that guarantees a unique firm in any FEE. Subsection III.D provides an example where this condition is violated, and multiple partnerships form in an FEE.

CONDITION M.  $\pi_M(a_M - w) - K < 0$ .

Under Condition M a firm that hires only the medium quality employees makes negative profits. As low quality employees also cause negative profits, any profitable firm must hire some high quality employees. Increasing returns then implies that there cannot be more than one such firm.

LEMMA 1. Assuming Condition M, any free-entry equilibrium involves a single active firm, either partnership or corporation, that hires exactly as in the monopoly model.

The reason that the unique FEE firm hires like a monopolist is because its marginal employee faces a constant reservation wage  $w$ . Because the firm that emerges in an FEE will hire as a monopolist, a useful reference point is the economic profit (revenue net of outside option wages and fixed costs) that is generated by an equilibrium corporation or partnership in the monopoly model (i.e., assuming that there is a monopoly firm with no potential for entry).

Denote the equilibrium profits of a monopoly corporation by  $\Pi^C(\mu)$ , where

$$\Pi^C(\mu) = \pi_H(a_H - w) + \pi_M(a_M - w) + \lambda_L^C \pi_L(a_L - w) - K.$$

Here  $\lambda_t^C$  denotes the fraction of type  $t$  workers who are hired by an

12. A second possibility would be that once an entrant attracts some workers from a firm  $i$  at wage  $w_t^i$ , then the incumbent firm  $i$  may become unsustainable, causing it to dissolve, and having its remaining employees willing to join the entrant for wages lower than  $w_t^i$ . This solution concept has the drawback that by opening the door to many possible entry deviations, equilibrium will often not exist.

equilibrium corporation. Proposition 4 showed that an equilibrium corporation would hire all high and medium quality workers and, as  $\mu$  decreased, an increasing fraction of low ability workers. In particular, if  $\mu > \mu^{**}$ , then  $\lambda_L^C = 0$ ; if  $\mu \in (\mu^*, \mu^{**})$ , then  $\lambda_L^C \in (0, 1)$ ; and if  $\mu < \mu^*$ , then  $\lambda_L^C = 1$ .

Similarly, denote the equilibrium profits of a monopoly partnership by  $\Pi^P(\mu)$ , where

$$\Pi^P(\mu) = \pi_H(a_H - w) + \lambda_M^P \pi_M(a_M - w) + \lambda_L^P \pi_L(a_L - w) - K.$$

Here  $\lambda_t^P$  denotes the fraction of type  $t$  workers that are hired by an equilibrium partnership. Proposition 4 showed that a partnership would always hire the high ability workers, that  $\lambda_M^P$  equals 0 if  $\mu > \mu^H$  and 1 otherwise; and that  $\lambda_L^P$  equals 0 if  $\mu > \mu^L$  and 1 otherwise.

Finally, let  $s(\mu)$  denote the monopoly partnership equilibrium share:

$$s(\mu) = w + \frac{\Pi^P(\mu)}{\pi_H + \lambda_M^P \pi_M + \lambda_L^P \pi_L}.$$

We can now characterize the conditions under which there is an FEE with a single operating corporation or with a single operating partnership. We proceed by considering different cases corresponding to the quality of market monitoring.

The easiest case to consider is  $\mu \leq \mu^L$ , where both an operating partnership or an operating corporation would hire all workers. In this case, both forms of organization are equally inefficient, and either could emerge in a free-entry equilibrium. An operating partnership, of course, pays its employees equally, while an operating corporation disburses its profits to its employees, paying its high ability workers enough to keep them from leaving to form a partnership.

**PROPOSITION 5.** If  $\mu \leq \mu^L$ , there is a corporation FEE and a partnership FEE.

When  $\mu > \mu^L$ , an operating partnership will not hire low ability workers, and might be of inefficiently high quality, while a corporation might hire some low ability workers inefficiently. For a corporation to operate in an FEE, it must be able to retain its high ability workers; in particular, it must keep them from forming a partnership. Let  $MR_t^C = \mu a_t + (1 - \mu)p^C$  denote the marginal revenue of a type  $t$  worker in the monopoly corporation,

where  $p^C$  is the monopoly corporation equilibrium quality. The following condition characterizes corporation retention:

CONDITION C.  $\min\{MR_H^C, w + (\Pi^C(\mu))/(\pi_H)\} > s(\mu)$ .

Condition C says that the maximum amount an operating corporation can pay its high ability employees exceeds what these workers would earn in an equilibrium partnership. This condition is both necessary and sufficient for the existence of an FEE with an operating corporation.

The conditions for a partnership to operate in an FEE depend on the level of market monitoring. If  $\mu > \mu^H$ , an operating partnership will hire only high types and have inefficiently high quality. Nonetheless, if Condition C is violated, an entering corporation cannot disturb such a partnership. This yields the following result.

PROPOSITION 6. If  $\mu \geq \mu^H$ , there is a corporation free-entry equilibrium if and only if condition C holds and a partnership free-entry equilibrium if and only if condition C fails.

This leaves the case where  $\mu \in [\mu^L, \mu^H]$ , where an operating partnership is efficient, while an operating corporation may potentially hire some low ability workers. Despite the efficiency of partnerships in this region, there may not be an FEE with an operating partnership. The reason is that a partnership may be susceptible to entry by a corporation that skims off its high ability employees (potentially adding some low ability employees). The following condition characterizes when partnerships are immune to this threat.

CONDITION P. There do not exist  $p, \lambda_L > 0$  such that (1)  $p = (\pi_H a_H + \lambda_L \pi_L a_L)/(\pi_H + \lambda_L \pi_L)$ ; (2)  $\mu a_H + (1 - \mu)p - s(\mu) > 0$ ,  $\mu a_M + (1 - \mu)p - s(\mu) < 0$ , and also  $\mu a_L + (1 - \mu)p \geq w$  and  $\lambda_L \leq 1$  with the last two inequalities satisfying complementary slackness; and (3)  $\pi_H(a_H - s(\mu)) + \lambda_L \pi_L(a_L - w) - K > 0$ .

Condition P says that there does not exist an entering corporation, with market beliefs about quality  $p$ , and a hiring pattern  $\lambda = (\lambda_H, \lambda_M, \lambda_L)$  with  $\lambda_H = 1$ ,  $\lambda_M = 0$  and  $\lambda_L > 0$  that satisfies three properties: first, the market belief  $p$  is correct given  $\lambda$ ; second, the hiring pattern  $\lambda$  is optimal given the competing wages of an incumbent efficient partnership (i.e., given belief  $p$  and the competing partnership share  $s(\mu)$  claimed by high and

medium types, the corporation prefers to hire the high types and a fraction  $\lambda_L$  of the low types, but not the medium types); and third, it makes positive profits paying its workers the least possible wage that will attract them. If no such entrant exists, an incumbent partnership cannot be disturbed.

PROPOSITION 7. If  $\mu^L < \mu < \mu^H$ , there is a corporation FEE if and only if Condition C holds and a partnership FEE if and only if Condition P holds.

A natural question is whether conditions C and P can fail simultaneously. It turns out that, if  $\alpha_M < (\pi_H \alpha_H + \pi_L \alpha_L) / (\pi_H + \pi_L)$ , one can construct examples where both indeed fail, so there is no FEE. The basic idea is that a corporation can enter by hiring  $H$  and  $L$  types if there is an operating partnership. But only if a corporation is operating, then it will hire all the medium type workers, lowering its marginal revenue for the high types below what an efficient entering partnership can offer them. Thus, the problem for both organizations is that they cannot retain their high ability workers.

A way to overcome this is to expand our definition of FEE to allow for a firm that operates as a corporation but with the high ability workers as owners. This allows the high ability workers to pay medium and low types their outside option. At the same time, each high ability worker/owner receives an amount above his marginal product, which prevents them from leaving to form a partnership. An interesting extension, beyond the scope of this paper, is to investigate conditions under which market competition forces firms to give productive workers ownership shares in order to retain them.

### *III.C. The Effect of Competition on Sharing Rules*

A novel aspect of the competitive model is that even if one organizational form would lead to efficient hiring, that form of organization may not be able to survive free entry. As noted above, the reason is that even if an organization hires efficiently, it may not be able to pay its best employees enough to prevent them from being hired away by an entering firm. In the case of a partnership, this occurs because profit sharing can imply sizable redistribution from top employees to the less able.

A simple example demonstrates how an efficient partnership can unravel from the top. Suppose that there are equal fractions of each worker type,  $\pi_L = \pi_M = \pi_H = 1/3$ , that  $\omega = 1/3$ ,  $K =$

1/3, and that  $(a_H, a_M, a_L) = (3, 1, 0)$ . Using formulas derived in the proof of Proposition 4,  $\mu^H = 1/2$ ,  $\mu^{**} = 5/6$ ,  $\mu^* = 3/4$ , and  $\mu^L = 1/4$ . For the purpose of the example let  $\mu = 1/2$  so that an operating partnership would efficiently hire high and medium ability workers, paying a share  $s(1/2) = 3/2$ . As we now show, such a partnership cannot fend off the entry of an inefficient corporation.

Consider a corporation that enters with market beliefs that it will hire all the high and low ability workers, so that  $\hat{p} = 3/2$ . Its marginal profit from hiring high types is  $\mu a_H + (1 - \mu)\hat{p} - s(1/2) = 3/4$ ; its marginal profit from hiring low types is  $\mu a_L + (1 - \mu)\hat{p} - w = 5/12$ ; and its marginal revenue from hiring medium types is  $\mu a_M + (1 - \mu)\hat{p} - s(1/2) = -(1/4)$ . Thus, its optimal hiring behavior—employing all high and low types—justifies the market's beliefs. Moreover, its entry leads to positive profits:

$$\Pi = \pi_H(a_H - s) + \pi_L(a_L - w) - K = 1/18,$$

implying that condition P fails and an efficient partnership cannot operate in an FEE.

With these parameters, there is an FEE in which a corporation operates and inefficiently hires all workers. To see this, observe that such a corporation generates revenue of 3/4, leaving 1 for salaries after paying the fixed cost. Suppose it pays low type workers  $w^L = 1/3$ , medium type workers  $w^M = 1/2$ , and high ability workers  $w^H = 13/6$ . A partnership that tries to enter cannot attract the high ability workers given this salary (because it would hire efficiently leading to a profit share  $s(1/2) = 3/2$  for all employees), and it is easy to check that there is no profitable entry by a corporation.

The example suggests that partnerships that do a great deal of redistribution may be susceptible to an increase in labor market competition. Faced with this prospect, a partnership might convert to corporate form by selling to an outside buyer or making a public equity offering. Alternatively, competition might induce a change in the partnership's compensation structure. That is, a partnership in danger of losing its best partners might respond by implementing some form of productivity-based compensation. The danger of course is that as compensation becomes more productivity based, profit sharing is reduced, and there may be an incentive on the margin to bring in additional partners at lower compensation who would previously have been below the firm's

threshold. In this way, there is the possibility that competition will undermine a partnership's commitment to quality service provision. These ideas may shed some light on the changes that have occurred in many law firms in recent decades, as we discuss in the next section.<sup>13</sup>

### III.D. Quality Ranked Firms

In the analysis above, the assumption of increasing returns guaranteed that there can never be more than one corporation in an FEE, while Condition M ruled out the possibility of multiple partnerships. If Condition M fails, there can be an FEE where two quality ranked firms coexist.<sup>14</sup> A necessary condition for such an equilibrium to exist is that the two firms, taken together, generate greater profits than would a monopoly corporation. The following example demonstrates this case.

Suppose again that there are equal fractions of each worker type,  $\pi_L = \pi_M = \pi_H = 1/3$ , that  $w = 2$ ,  $K = 1/9$  and  $(a_H, a_M, a_L) = (4, 3, 0)$ . Using formulas derived in the proof of Proposition 4,  $\mu^{**} = 3/7$ ,  $\mu^H = 1/3$ ,  $\mu^* = 1/7$  and  $\mu^L = 1/21$ . We will show that whenever  $\mu \in (1/3, 5/12)$ , there is an FEE with two quality ranked partnerships, and an FEE with a high quality partnership and a medium quality corporation.

First, note that if  $\mu > \mu^H = 1/3$ , a high ability partnership pays a share  $s^H = a_H - (K/\pi_H) = 11/3$  and will not want to add medium ability partners. Therefore, a medium ability partnership that pays a share  $s^M = a_M - (K/\pi_M) = 8/3$  can still form. Such a partnership is profitable, and has no incentive to hire low ability workers because

$$\mu a_L + (1 - \mu)a_M = 3(1 - \mu) < 8/3 = s^M.$$

13. While we focus on how competition for top workers can undermine an efficient partnership, it is also possible to construct examples where an efficient corporation is unable to pay top employees enough to keep them from leaving to form a partnership. In the case of Goldman Sachs discussed earlier, for instance, some members of the firm felt that it would be harder to retain top employees as a publicly owned firm. In our model, if  $\mu > \max\{\mu^{**}, \mu^H\}$  and Condition C fails because  $MR_H^C < s(\mu)$ , then a corporation would operate efficiently, yet the unique FEE has a partnership of inefficiently high quality. This occurs, for example, if  $\pi_L = \pi_M = \pi_H = 1/3$ ,  $(a_H, a_M, a_L) = (3, 1, 0)$ ,  $w = 1$ ,  $K = 1/9$  and  $1/2 < \mu < 2/3$ .

14. The intuition is that once a top-interval stable partnership is formed, it may be of too high quality so that starting from the marginal agent who is not in the partnership, a second stable partnership of lower quality can be sustained. There may be several such partnerships that can achieve positive economic profits. Farrell and Scotchmer [1988] consider a cooperative game model of partnerships that generally results in quality ranked partnerships.

If these two partnerships exist, another partnership cannot form and disrupt them. Consider instead entry by a corporation. If a corporation enters with beliefs  $p^e$ , its marginal profit from hiring low ability workers is  $MR(L) - w = \mu \cdot 0 + (1 - \mu)p^e - 2$ ; its marginal profit from hiring medium ability workers is  $MR(M) - s^M = \mu \cdot 3 + (1 - \mu)p^e - 8/3$ , and its marginal profit from hiring high ability workers is  $MR(H) - s^H = \mu \cdot 4 + (1 - \mu)p^e - 11/3$ . Therefore, if  $1/3 \leq \mu \leq 5/12$ , the gain to hiring medium types is greatest, and the gain to hiring high types is smallest. An entering corporation cannot profit by hiring only medium types because it would duplicate an existing partnership. But for a corporation to enter and hire the high types as well as the medium types, it would have to hire the low types as well, and hiring all workers leads to negative total profits (equal to  $-5/9$ ) after paying the high and medium types their partnership shares.

With these parameters, there is also an equilibrium with a high quality partnership and a medium quality corporation that pays its workers  $8/3$  (i.e., identical to a medium quality partnership). Such a configuration is immune to entry for the same reasons as above.

Interestingly, it is not possible to have a mixed equilibrium with a high quality corporation and a low quality partnership, because the corporation would be able buy out the partnership and save on the fixed costs. Thus, if corporations and partnerships coexist in our model, the partnerships must be higher quality.

#### IV. DISCUSSION

In this section we relate the model to some stylized empirical facts and to some recent changes in professional service firms. We then discuss a few aspects of partnerships that our model can explain, and a few legal and regulatory issues we have ignored.

##### *IV.A. Partnerships in Practice*

At the outset we observed that partnerships have been the traditional mode of organization in the professional services despite being relatively rare in other industries.<sup>15</sup> This broad pattern, which our model can rationalize, is well-known. Going be-

15. A rare exception is the Washington plywood mills studied by Craig and Pencavel [1992].



yond this, we would like to consider more detailed evidence about the patterns of partnerships across industries and about changes over time in the organization of professional services.

*Market Monitoring and Legal Form of Organization.* Our theory implies that fixing a certain professional sector, if the quality of one service within this sector is harder to evaluate than another, then firms producing the first service are more likely to be organized as partnerships. Here we provide several illustrative examples that are consistent with this prediction, using data on the legal form of organization in different industries from the 1997 U. S. Economic Census.

The accounting profession includes both tax preparation firms and financial accounting (auditing) CPA firms. We believe that it is significantly harder to assess the quality of financial accounting services, with its standards and regulations, than to assess the quality of a tax accountant, especially with developments in tax preparation software that automate much of the process. Through the lens of our model, financial accounting is a low- $\mu$  service while tax return preparation is a high- $\mu$  service. According to the 1997 Census, as measured by revenue, 67 percent of tax preparation work was done by corporations while only 4 percent was done by partnerships (almost all of the remainder is done by sole proprietorships). In contrast, about 61 percent of financial accounting work was done by partnerships while only 32 percent was done by corporations.

Another example can be found in consulting. The Census distinguishes between administrative and management consulting and human resource services. We believe the former is hard to evaluate, making it a low- $\mu$  service. Indeed, firms often hire management consultants to reorganize their business because they are unable to evaluate a particular problem. Human resource services, or "head-hunting" is arguably a high- $\mu$  service—clients typically choose from a list of candidates provided by the consultant, indicating that they are able to evaluate the consultant's output. According to the 1997 Census, about 28 percent of management consulting revenues were generated by partnerships, and about 69 percent by corporations. In contrast, for human resource consulting, partnerships account for only 5 percent of revenue and corporations for about 90 percent.

A third example is legal services. Offices of Lawyers employ legal practitioners that are engaged in the practice of law, which

we consider to be a low- $\mu$  service. Other Legal Services comprises establishments of legal practitioners who are not lawyers and attorneys, and are primarily engaged in providing specialized legal or paralegal services such as title handling. These services are easier to perform and verify, and we consider them to be high- $\mu$  services. Once again, the pattern we predict emerges: for Offices of Lawyers about 48 percent of revenue comes from partnerships and about 40 percent from corporations. In contrast, for Other Legal Services firms about 6 percent of revenues comes from partnerships while about 88 percent comes from corporations.

A caveat to these comparisons is that the Census reports the *legal form* of organization, while our theory emphasizes *functional* differences between partnerships and corporations. In principle, a legal corporation can function similarly to the partnerships we consider, and a legal partnership need not do significant profit sharing.<sup>16</sup> Our census comparisons are relevant to the extent that a firm's legal status and the lay definitions that we employ are correlated. In practice, there seems to be significant, though far from perfect, correlation.<sup>17</sup>

*Market Monitoring and Specialization.* Our theory rests on the assumption that insiders of a professional service can better evaluate their peers than can the clients of these services. Arguably, if a certain sector of a professional service was divided into specialties, one would expect this commitment power to work best for providers in the same, or similar areas of practice than for those whose expertise and training are less similar. In a recent paper, Garicano and Hubbard [2003] gather detailed data on the specialization of lawyers in law firms. They conclude that "Lawyers are more likely to work at the same firm with lawyers in their own field than with lawyers in any other field. This reflects groups of partners and associates in the same field working at the same firm" [p. 30].

16. Historically this was not the case. As late as the 1950s firms lost their legal partnership status for attempting to depart too radically from equal-sharing. Currently, if parties organize as a partnership, equal sharing of profits is the legal default, but this default can be contracted around.

17. For instance, about 40 percent of law office revenue originates in corporations. Nevertheless, our sense is that an overwhelming fraction of law offices are structured around profit-sharing agreements, which would classify them as partnerships in our model. As another example, the consulting firm Bain Inc. is legally a corporation, but operates functionally as a partnership.

*Recent Trends in the Professional Services.* The prevalence of partnerships in the professional services dates back at least to the beginning of the twentieth century. The past two decades, however, have seen striking organizational changes in some of these industries. We briefly discuss some of these changes in light of our theory.

Both anecdotal and empirical evidence suggests that law firms increasingly have moved away from the traditional method of lock-step or seniority-based profit sharing (the “Cravath model,” after the prestigious New York law firm Cravath, Swaine and Moore) in favor of productivity-based, “eat what you kill” forms of profit sharing [Altman Weil 2000]. These changes have made law firms less like the partnerships we have modeled and more corporate—although it should be emphasized that even law firms that use productivity measures in compensation often do a great deal of redistribution.<sup>18</sup> Our analysis suggests several possible explanations for this trend: redistribution may have become less sustainable due to competition in the labor market or changes in the returns to talent; alternatively, changes in market information might have made a commitment to equal sharing less valuable.

Though we are not aware of a comprehensive empirical study, there is some evidence of a competitive trend in the labor market for lawyers. One commonly referenced cause is the changing role of in-house counsel. Gilson and Mnookin [1985] write that “twenty years ago, the chief in-house lawyer for a corporation was commonly viewed as a competent professional who probably would not quite measure up to partnership quality . . . Today, however, corporations regularly persuade important partners in major law firms to resign from the partnership to become general counsel”<sup>19</sup> [p. 382]. To the extent that this change has led to a more active market for senior lawyers, our analysis suggests that top lawyers in firms with equal-

18. We came to this conclusion after discussions with several knowledgeable lawyers. All agreed that even at firms that do a relatively large amount of productivity-based compensation, a partner’s take on the marginal dollar he brings in is likely to be quite small in absolute terms, perhaps on the order of ten cents or less.

19. There is certainly anecdotal evidence supporting Gilson and Mnookin’s claim. A favorite example of lawyers is Mike Jacobsen, who left the prestigious law firm Cooley Godward to become the general counsel of eBay, and shortly amassed over \$100 million in equity (see also DeLong and Nanda [2004] on Silicon Valley’s Venture Law Group). While the quality of general counsel offices may have improved, however, the fraction of lawyers in private industry has not. It has been roughly constant at around 10 percent since 1960 [Carson 1999].

sharing compensation might credibly threaten to leave if compensation practices were not altered. A second consequence of better in-house counsel may be that firms become more discriminating consumers. In the context of our model this could be interpreted as better monitoring (higher  $\mu$ ), an effect that would also push toward a more corporate form.<sup>20</sup>

It is also possible that a change in the returns to ability or specialty could provide an explanation for the move toward productivity-based compensation. Again, we are not aware of rigorous empirical evidence on whether the returns to skill have changed in the legal industry, but recent years have seen an increase in litigation awards and in some accounts a rise in star-oriented law firms. To the extent that a shift in the distribution of lawyer productivity might allow some partners to demand larger salaries—for instance, by threatening to start their own firms—it could also lead to the sort of unraveling we considered in the previous section.

Law firms are not the only professional service firms to become more corporate in recent years. In the financial services industry, virtually all the major investment banks have sold their partnerships to outside investors. In the period from 1981 to 1986, these sales included Salomon Brothers, Lehmann Brothers, Kidder Peabody, Bear Stearns, Dean Witter, and Morgan Stanley. This remarkable transformation coincided with several changes in the industry—the introduction of trading in risky derivatives and the opening of international markets, which some argue required firms to have larger capital bases, a much more mobile and competitive labor market, and rapid growth and then consolidation of the major firms. To the extent that our model relates the corporate form to a more competitive labor market and an increase in optimal firm size, the simultaneity of these changes seems consistent with our basic story. Below, we argue that increased capital requirements also favor the corporate form.<sup>21</sup>

20. It is important to note that even though labor market competition and better market monitoring both favor the corporate form, the latter is associated with an increase in efficiency, while the former is not. With detailed data, one can try to tease out the two effects by checking whether the composition of firms has changed much, which would be more in line with a more competitive market.

21. Many advertising partnerships sold out at a similar point in time (and there was significant growth in major firms). There also have been significant changes in the structure of medical practices. A full discussion of these changes is beyond the scope of this paper.

#### IV.B. Features of Partnerships

*Capital Requirements.* A notable feature of many professional service firms is that they are not capital-intensive.<sup>22</sup> Thus, one might ask whether capital requirements are related to the distribution of partnerships across industries. Of course, the relationship is not perfect—in many low-capital industries, the corporate form is standard. For instance, the software industry has very low capital requirements, but very few partnerships.<sup>23</sup> Still, the correlation suggests looking for a reason why partnerships might be at a disadvantage in raising capital. As it turns out, our model suggest a very simple reason why partnerships might have trouble at least raising equity finance.

To see why, suppose that a partnership could sell a stake (e.g., a claim on some percent of profits) to outside shareholders. The immediate problem that arises is that these shareholders now have a different objective than the partners. While the partners want to keep average profitability high, the shareholders are interested in total profits—they are likely to want to expand the firm at the cost of lower quality. How this conflict plays out depends on how control is allocated, but it seems clear that such a conflict would be likely to have adverse consequences.<sup>24</sup> Thus, one story for why investment banks sold out their partnerships in the 1980s is that they felt compelled to raise capital and saw a sale to outside shareholders as the best avenue to do this. (A main holdout was Goldman Sachs, which was able to raise a significant amount of equity finance in the 1980s, well before its eventual IPO, without dissolving its partnership.)

*Up-or-Out Promotion Schemes.* A common feature of many partnerships, particularly in law, is the use of up-or-out promo-

22. One notable exception is that some medical partnerships have significant investments in specialized equipment, though this equipment is sometimes leased. As we mentioned above, investment banks have become more capital intensive, a change that coincided with partnership sales.

23. See U. S. Census. In light of our model, software is a product that is relatively easy for the market to assess, despite the importance of human capital in its production. So a partnership arrangement would not have an important benefit. Enterprise software (large specialized programs) might be somewhat different, although typically the product is purchased in stages and can be tested before payments are made (unlike, for instance, medical care where quality may not be known for years if ever).

24. This assumes that outside shareholders buy a fixed fraction of the equity rather than join on as "passive" partners. However, there would be an incentive to lower quality even if outside shareholders bought partner shares because productive partners would feel less of a dilution effect from marginal hires.

tion schemes at the point when associates reach partner level. If we consider a dynamic interpretation of our model, we can suggest a simple explanation for this. Specifically, imagine that firms do not learn the actual talent of employees immediately (when they are hired) but rather after some initial employment period. Under this interpretation, the hiring decision in our model can be interpreted as a promotion to partner decision. Indeed, in an earlier version of this paper, we used exactly this approach with young employees joining the firm at a low wage (an "entry fee") and then being promoted to partner if they turned out to be above the threshold for promotion.

In this light, an up-or-out promotion scheme can be an integral part of a partnership's commitment to guaranteeing the high quality of long-term employees. Because current partners will promote only the best associates to a full partner share, those who are not of extremely high quality will be let go even if they might make a positive contribution to the firm's total profits. To the extent that partnerships can retain senior employees without promoting them to partner, some of the commitment to quality is lost. At the same time, if partnerships do less profit redistribution (e.g., move toward more productivity-based compensation), the title of partner becomes less meaningful, and the up-or-out system becomes less important.<sup>25</sup>

This interpretation seems consistent with recent trends in law firms. In many firms, changes in the compensation structure have been accompanied by a relaxation of the up-or-out system. As Gilson and Mnookin put it: "firms are creating new categories of employee lawyers . . . permanent associate, staff lawyer, special council, non-equity partner, junior partner" [1989, p. 567]. Some evidence of this comes from the *American Lawyer* magazine's annual survey of top law firms. Of the top 100 revenue-grossing law firms in 2003, only 23 have a single partnership tier. In contrast, 55 of the top 100 firms had a single tier in the 1994 survey [Frankel 2004].

25. Carmichael [1988] explores the up-or-out characteristic of academic tenure and argues that the security of older faculty ensures that they will not fear hiring young talented academics because the latter will not replace them. Carmichael's story, similar to ours, emphasizes the selection of workers, but naturally ignores profit sharing given his application. Kahn and Huberman [1988] propose a different role for up-or-out schemes by showing that they can mitigate a form of holdup involving human capital investment. However, they do not have results suggesting that we should see this form of promotion in partnerships but not in corporations.

*Noncompete Clauses.* A noncompete clause in a labor contract specifies that if an employee leaves a firm, he cannot practice in the same profession within some time period and geographical location. Many partnerships include some form of noncompete clause in their contracts.<sup>26</sup> One interpretation stemming from incentive theory is that these clauses might be in place to mitigate holdup problems in general human capital investment. For example, if a law firm makes a large investment to train an associate, this investment could be lost if the associate leaves and a noncompete clause might be useful to alleviate this holdup. However, this account looks weak once we observe that these clauses often are signed at the *late stage* of promotion to partner.

In the context of our model, noncompete clauses might play a different role, namely to prevent employees from taking up lucrative outside options rather than sharing profits with the other partners. In this account, the usefulness of such a clause turns on the employee not having precise knowledge of his future alternatives at the time of becoming a partner. If this were known, the worker would demand at least his outside wage as a condition for becoming a partner in a given firm. If there is uncertainty, however, a prospective partner might sign a noncompete clause that could eventually become binding in the event that attractive outside opportunities arose. In such an environment, a noncompete clause can play an important role: by hindering departure, they protect the partnership against the danger of unraveling.

#### *IV.C. Legal and Tax Issues*

Above, we noted that the legal and functional form of an organization need not coincide. Our sense is that a firm's choice of legal status tends to follow its functional organization, rather than the reverse. Nevertheless, because a firm's legal status may have liability, tax, and regulatory consequences, to the extent that legal form drives functional organization, these legal issues are potentially relevant for the observed distribution of partner-

26. A recent highly publicized example is Arthur Andersen. It should be noted the enforcement of noncompete clauses varies across states. For example, they are hard to enforce in California. Interestingly, in one Georgia case we came across, *Rash v. Toccoa Clinic Med. Assoc.*, 253 Ga. 322, 320 S.E.2d 170 [1984], the Georgia Supreme Court ruled that *partners* should receive particular leeway to make mutually beneficial covenants as they are in an equal bargaining position. In that case, the court upheld an agreement that prohibited physicians in a medical practice from leaving to practice within 25 miles of Toccoa, Georgia, for three years.

ships across industries. In this section we briefly discuss these legal and regulatory issues and argue that in and of themselves they do not explain observed functional differences in organizations.

*Limited Liability.* A prominent feature of the traditional General Partnership is the unlimited liability of the partners. In theory, unlimited liability might make partnerships either more or less attractive as an organizational form. It places partners at increased risk of financial ruin, but it provides clients with a strong signal of each partner's belief in her own and her colleagues' ability. In practice, unlimited liability seems to be a cost of partnerships rather than an explanation for their use. In particular, since the introduction of legal forms such as the limited liability partnership (LLP) and limited liability company (LLC), unlimited liability partnerships are rarely seen in the professional services.<sup>27</sup> For example, of the top 100 revenue-grossing law firms in *American Lawyer* magazine's 2003 ranking, over 90 are organized as LLPs.<sup>28</sup>

*Taxes.* Tax law also distinguishes partnerships from corporations, and hence provides another possible motive for choosing a partnership as one's legal form of organization. A main distinction is that, relative to a corporation, partnerships are free from the corporate income tax and thus can avoid the "double taxation" on dividends. (This distinction is relative to C-corporations—subchapter S-corporations, Limited Liability Companies, and Sole Proprietorships are taxed in the same way as partnerships.)

This distinction is surely important for certain investment vehicles, but it seems unlikely to be the sole explanation for the observed distribution of partnerships across industries. In particular, the differential tax treatment applies in all sectors, rather than just the professional sectors. Also, it often is possible for

27. The LLC was introduced by Wyoming in 1977, but did not receive partnership (flow-through) tax treatment from the IRS until 1988, after which it was recognized in many states. The LLP was introduced in Texas in 1991, and most states rapidly followed.

28. Similarly in accounting, all of the (at the time) Big 5 firms converted to LLPs when the option became available. Moreover, even before the introduction of the LLP and LLC, partnerships were able to purchase liability insurance—although unfortunately we do not have evidence on how widespread this was.



C-corporations to distribute earnings in a way that alleviates the double taxation problem.<sup>29</sup>

*Legal Constraints.* While firms nearly always have freedom in choosing between organizational forms (see Hansmann [1996, p. 85] for a discussion), there is one striking case where state law constrains organizational form. In most states, law firms are prohibited from having "layman" equity investors (though firms need not be wholly owned by their practicing partners). A remarkable feature of these laws is that they are to some extent self-imposed—they stem directly from the guidelines of the American Bar Association, the professional association of lawyers.

In the ABA's Model Rules for Professional Conduct, lawyers are prohibited from practicing in a for-profit corporation if non-lawyers have decision stakes in the firm (rule 5.4(d)). This is part of a broader rule (5.4) that Hazard and Hodes [1989] interpret as "[protecting] clients by increasing the likelihood that they will receive competent professional services." Our model is consistent with Hazard and Hodes in that we argue that partnerships will give rise to a higher quality than corporations. As we show, partnerships can also have the benefit of generating not just higher quality for clients, but higher profits for lawyers.<sup>30</sup>

## V. CONCLUSION

A fundamental economic problem is to understand the forces that lead to different forms of organization and hence determine the structure of productive enterprise in the economy. We have considered firms in which production is based on human capital. Relative to standard profit-maximizing corporations, profit-sharing partnerships are more selective in hiring, resulting in a higher level of quality than is dictated by profit maximization.<sup>31</sup> This quality commitment pays off if clients cannot perfectly ob-

29. We thank Joe Bankman of Stanford Law school for help on tax issues, and for pointing out that under the current tax code, corporations and partnerships can face practically the same tax liability if they are carefully designed.

30. One might wonder why the industry would need regulation to ensure the partnership form if individual firms would choose it directly. If lawyers had some "collective reputation" that could be hurt by rogue firms, a centralized regulation would be desirable to ensure quality.

31. In describing their practice on their web page, the highly distinguished law firm Cravath, Swaine and Moore states that "Our hallmark is the quality of our service. We are not, and will never try to be, the largest law firm measured by number of lawyers."

serve what they are buying. We used this insight to show that in markets where clients may not be able to monitor quality well, partnerships emerge as a desirable form of organization. We also discussed the impact of labor market competition, and used the model to explain features of partnerships such as up-or-out promotion and noncompete clauses.

Our analysis leaves open an important issue. Namely, decision rights are not emphasized in our model because in an equal-sharing partnership with no outside financing, all partners have the same objective. Once one moves away from strict equal sharing, the structure of decision rights and how partnerships are governed becomes an important topic for future research.

#### APPENDIX

*Proof of Proposition 1.* In solving both the corporation and partnership problems, we can restrict attention to choices of  $a$  for which  $\pi(a, a^e) \geq 0$ . Observe that the partnership is willing to lower its threshold slightly below some level  $a$  if and only if

$$\mu a + (1 - \mu)p(a^e) \geq \mu p(a) + (1 - \mu)p(a^e) - \frac{K}{1 - F(a)}.$$

But if this holds, and  $s(a, a^e) \geq w$ , then it must be that

$$\mu a + (1 - \mu)p(a^e) \geq w,$$

so the corporation also prefers to lower its threshold. Thus, the corporation will choose a lower hiring threshold (and a strictly lower threshold if  $a^P > \underline{a}$ ). QED

*Proof of Proposition 2.* By the definition of profits, for any  $a \in [\underline{a}, \bar{a}]$ ,

$$(5) \quad \Pi(a) \geq 0 \Leftrightarrow p(a) - \frac{K}{1 - F(a)} \geq w.$$

It follows that for any given value  $a$ , if  $\Pi(a)$  is positive, then the right-hand side of partnership's equilibrium condition (3) is greater than the right-hand side of the corporation's equilibrium condition (2), and conversely if  $\Pi(a)$  is negative, the right-hand side of (2) exceeds the right-hand side of (3). Also the left-hand side of the equilibrium conditions (2) and (3) are the same, and increasing in  $a$ . It follows that

$$\Pi(a^P) \cong 0 \Leftrightarrow a^P \cong a^C$$

and also that

$$\Pi(a^C) \cong 0 \Leftrightarrow a^P \cong a^C.$$

We conclude that for any given  $\mu$ ,  $\Pi(a^P)$  has the same sign as  $\Pi(a^C)$ , implying that the partnership obtains positive profits if and only if the corporation does. To consider whether either is profitable, it suffices to consider the corporation. If  $\mu = 1$ , then the corporation is profitable since  $a^C = a^{FB}$ , and by assumption  $\Pi(a^{FB}) > 0$ . If  $\mu = 0$ , the corporation is not profitable since  $a^C = a$  and  $\Pi(a) \leq 0$ . As  $a^C$  is strictly increasing in  $\mu$ , and  $\Pi(a)$  is strictly increasing in  $a$  on  $[a, a^{FB})$ , there exists some  $\underline{\mu} \in (0, 1)$  such that the corporation will operate for all  $\mu > \underline{\mu}$ . QED

*Proof of Proposition 3.* We know that  $a^P > a^C$  for all  $\mu \in (\underline{\mu}, 1]$ , and that if  $\mu = 1$ , then  $a^C = w$ , so  $\Pi(a^C)$  is maximal and greater than  $\Pi(a^P)$ . On the other hand, if

$$\mu = \mu^P = K/(\Pi(w) + K),$$

then  $a^P = w$ , so  $\Pi(a^P)$  is maximal, and  $\Pi(a^P) > \Pi(a^C)$ . Since  $\Pi(\cdot)$  is concave, there is some  $\hat{\mu} \in (\mu^P, 1)$  such that  $\Pi(a^C) \cong \Pi(a^P)$  whenever  $\mu \cong \hat{\mu}$ . QED

*Proof of Proposition 4.* We analyze the corporation and partnership equilibrium in turn, and then compare them.

*Corporation Equilibrium.* Because all types command the same wage  $w$ , a corporation prefers to hire high types first, then medium, and then low for any market expectation about quality. Moreover, if the corporation operates in equilibrium, it must be that  $p^e = p > w$ , so a profitable corporation necessarily hires all high and medium types in equilibrium. Therefore, we focus on the decision of what proportion  $\lambda_L$  of low types to hire:

$$\begin{aligned} \max_{\lambda_L \in [0, 1]} \Pi(\lambda_L) &\equiv [\pi_H + \pi_M + \lambda_L \pi_L] \\ &\times \left( \overbrace{\mu \left[ \frac{\pi_H a_H + \pi_M a_M + \lambda_L \pi_L a_L}{\pi_H + \pi_M + \lambda_L \pi_L} \right]}^{\text{actual quality } p(\lambda_L)} + (1 - \mu)p^e - w \right) - K. \end{aligned}$$

The marginal profit of additional low types is

$$(6) \quad \left. \frac{d\Pi}{d\lambda_L} \right|_{\lambda_L} = \mu a_L + (1 - \mu)p^e - w,$$

which is decreasing in  $\mu$  provided that  $p^e \geq w > a_L$ . Of course, in equilibrium,

$$p^e = p(\lambda_L) = \frac{\pi_H a_H + \pi_M a_M + \lambda_L \pi_L a_L}{\pi_H + \pi_M + \lambda_L \pi_L}.$$

There are three possible equilibrium outcomes corresponding to  $\lambda_L = 0$ ,  $\lambda_L = 1$ , and  $\lambda_L \in (0,1)$ . The first case, where no low types are hired, is an equilibrium if  $d\Pi/d\lambda_L \leq 0$  evaluated at  $\lambda_L = 0$  and  $p^e = p(\lambda_L = 0)$ . These conditions are satisfied whenever

$$\mu \geq \mu^{**} = \frac{\pi_H(a_H - w) + \pi_M(a_M - w)}{\pi_H(a_H - a_L) + \pi_M(a_M - a_L)}.$$

The second case, where  $\lambda_L = 1$  so all workers are hired, is an equilibrium if  $d\Pi/d\lambda_L \geq 0$  evaluated at  $\lambda_L = 1$  and  $p^e = p(\lambda_L = 1)$ . These conditions are satisfied whenever

$$\mu \leq \mu^* = \frac{\pi_H(a_H - w) + \pi_M(a_M - w) + \pi_L(a_L - w)}{\pi_H(a_H - a_L) + \pi_M(a_M - a_L)},$$

where  $\mu^* < \mu^{**}$  by inspection.

Finally, if  $\mu \in (\mu^*, \mu^{**})$ , there is an equilibrium where  $d\Pi/d\lambda_L = 0$  and  $p^e = p(\lambda_L)$  for some  $\lambda_L \in (0,1)$ . In this case, the equilibrium condition is

$$\mu a_L + (1 - \mu)p(\lambda_L) - w = 0.$$

As  $p(\cdot)$  is decreasing in  $\lambda_L$  and the left-hand side is decreasing in  $\mu$ , the equilibrium quality of the firm will be increasing in  $\mu$  over the range  $(\mu^*, \mu^{**})$ .

*Partnership Equilibrium.* Because all partners are paid the same share, a partnership always wants to add high types first, then medium types, and then low types. Because each high type generates the same marginal revenue and allows the partnership to spread the fixed cost over a larger set of workers, a partnership will want to add all high types for any market expectation. So the relevant decision is to choose the proportion  $\lambda_M$  of medium types

to hire, and, if  $\lambda_M = 1$ , the proportion  $\lambda_L$  of low types to hire. The objective is to maximize the average profit share:

$$\max_{\lambda_L, \lambda_M \in [0, 1]} s(\lambda_L, \lambda_M) \equiv \mu \frac{\overbrace{\pi_H a_H + \lambda_M \pi_M a_M + \lambda_L \pi_L a_L}^{\text{actual quality } p(\lambda_L, \lambda_M)}}{\pi_H + \lambda_M \pi_M + \lambda_L \pi_L} + (1 - \mu) p^e - \frac{K}{[\pi_H + \lambda_M \pi_M + \lambda_L \pi_L]}$$

The marginal benefit of hiring additional medium types, assuming that, no low types are hired is

$$\left. \frac{ds}{d\lambda_M} \right|_{\lambda_L=0, \lambda_M} = \mu a_M + (1 - \mu) p^e - s(0, \lambda_M),$$

while the marginal benefit of hiring additional low types, assuming all medium types are hired is

$$\left. \frac{ds}{d\lambda_L} \right|_{\lambda_L, \lambda_M=1} = \mu a_L + (1 - \mu) p^e - s(\lambda_L, 1).$$

In equilibrium,

$$p^e = p(\lambda_L, \lambda_M) = \frac{\pi_H a_H + \lambda_M \pi_M a_M + \lambda_L \pi_L a_L}{\pi_H + \lambda_M \pi_M + \lambda_L \pi_L}.$$

The partnership's problem is convex in the choice variables  $\lambda_L$  and  $\lambda_M$ . That is, holding the market expectation fixed, if the partnership wants to hire an initial medium type, it will want to hire all medium types. The reason is that every medium type generates the same marginal revenue  $\mu a_M + (1 - \mu) p^e$ , but the share per partner increases with the number of hires because the fixed costs are spread more widely. The same argument applies for low types.

Consequently, there are three possible equilibrium outcomes: the partnership hires only high types, so  $\lambda_L = \lambda_M = 0$ ; the partnership hires both high and medium types, so  $\lambda_L = 0$  and  $\lambda_M = 1$ ; and the partnership hires all workers, so  $\lambda_L = \lambda_M = 1$ .

The first possibility, that the partnership hires only high types, is an equilibrium if  $ds/d\lambda_M \leq 0$  evaluated at  $\lambda_L = \lambda_M = 0$  and  $p^e = p(0, 0)$ . These conditions are satisfied whenever

$$\mu \geq \mu^H = \frac{K}{\pi_H(a_H - a_M)},$$

where  $\mu^H < 1$  by Assumption A.

The second possibility, that the partnership hires high and medium types is an equilibrium if  $\mu < \mu^H$  and also  $ds/d\lambda_L \leq 0$  evaluated at  $\lambda_L = 0$ ,  $\lambda_M = 1$  and  $p^e = p(0,1)$ . These conditions are satisfied whenever

$$\mu^H > \mu \geq \mu^L = \frac{K}{\pi_H(a_H - a_L) + \pi_M(a_M - a_L)},$$

where  $\mu^L < \mu^H$  by inspection.

The last possibility is that the partnership hires all workers. This occurs whenever  $\mu < \mu^L$ .

*Comparison of Corporation and Partnership Equilibria.* The basic argument of Proposition 1, that for any market expectation  $p^e$  and market monitoring level  $\mu$ , a corporation will provide lower quality than a partnership, remains unchanged in the three-type setting. The argument is precisely the same. Adding an additional worker on the margin brings in some set amount of marginal revenue costs the corporation  $w$  and costs a viable partnership a share  $s \geq w$ .

This argument implies that the threshold  $\mu^*$  below which the corporation will hire all workers is above that of the corresponding partnership threshold  $\mu^L$ , which can also be checked by noting that A1 implies that

$$\mu^* - \mu^L = \frac{a_H\pi_H + a_M\pi_M + a_L\pi_L - w - K}{\pi_H(a_H - a_L) + \pi_M(a_M - a_L)} > 0.$$

The final question of interest is whether  $\mu^H$  can be compared systematically with either  $\mu^*$  or  $\mu^{**}$ , but inspection implies that it cannot be without further parametric assumptions. This concludes the proof of Proposition 4. QED

*Proof of Lemma 1.* Condition M implies that if there are several active firms, each must hire some  $H$  type workers. Suppose that there are two (or more) partnerships. The partnership with (weakly) higher share can add the  $H$  type workers of the other partnership and increase its share even more, so current hiring cannot be optimal. Similarly, if there is an active partnership and an active corporation, then either the partnership can profitably add the corporation's  $H$  type workers, or the corporation is paying a salary  $w_H$  that exceeds the partnership's share  $s$ . In the latter case, for the corporation to hire some  $H$  types, it

must be that  $\mu a_H + (1 - \mu)p \geq w_H > s$ —i.e., its marginal revenue from high types exceeds  $w_H$ , which exceeds  $s$ . Thus, the corporation can attract all the high types from the partnership at the wage  $w \in (s, w_H)$  and increase its profits. Finally, if there are at least two active corporations, there must be room for an entrant that hires all workers employed by the two corporations and saves on fixed costs. The last part of Lemma 1 is immediate: because the incumbent firm faces a constant competing wage  $w$ , in equilibrium it must hire just as in the monopoly model. QED

*Proof of Proposition 5.* Because  $\mu^L \leq \mu^*$ , both the monopoly partnership and monopoly corporation hire all workers in this range. The partnership is an FEE because any entering corporation necessarily hires all workers (note that if a corporation entered with the market believing it would hire only high and medium workers its incremental revenue from hiring the low workers would be the same as the partnership's, so it would hire them) and hence makes zero profits.

There is also a corporation FEE where the active corporation hires all workers and pays out its net revenue to its workers, tilting the payments as much as possible to high ability workers. Specifically, the corporation pays high types their maximal wage  $w_H = \min\{MR^H, w + (\Pi^C(\mu))/(\pi_H)\}$ , and pays lower types as follows. If  $w_H = w + (\Pi^C(\mu))/(\pi_H)$ , then  $w_M = w_L = w$ , while if  $w_H = MR^H$ , medium types get  $w_M = \min\{MR^M, w + (\Pi^C(\mu) - \pi_H(MR^H - w))/(\pi_M)\}$  and low types get  $w_L = \max\{w, (\Pi^C(\mu) - \pi_H(MR^H - w) - \pi_M(MR^M - w))/(\lambda_L \pi_L)\}$ . A partnership cannot enter successfully because if it succeeded in hiring the high ability workers, it would hire all workers; but given this, its share would be less than  $w_H$ , and high types would not be willing to join. QED

*Proof of Proposition 6.* First observe that if  $\mu \geq \mu^H$  then a monopoly partnership is inefficient,  $\lambda_M^P = \lambda_L^P = 0$ . Now, if Condition C fails, there cannot be a corporation FEE because the corporation would necessarily pay less than  $s(\mu)$  so the monopoly partnership could enter. Moreover, the monopoly partnership is an FEE because any entering corporation would necessarily hire as a monopoly given that medium and low types would have reservation wage  $w$ . But an entering monopoly corporation could not attract the high types to leave the partnership, by failure of condition C.

On the other hand, if condition C holds, there cannot be a

partnership FEE because a corporation could enter, hiring as a monopolist and attracting the partnership members. Moreover, there is a corporation FEE in which the corporation hires as a monopoly and disburses its net revenue exactly as in the proof of Proposition 5—by tilting payments as much as possible to the high ability workers. Given this wage schedule, an entering partnership with  $\lambda_M^P = \lambda_L^P = 0$  cannot attract the  $H$ -types by condition C while an entering corporation would necessarily hire the same set of workers and therefore make zero profits. QED

*Proof of Proposition 7.* If Condition C holds, there is a corporation FEE where the corporation hires as a monopolist and pays exactly as in the proof of Proposition 5. Verifying the FEE is identical. (A small point to note is that Condition C surely is satisfied if  $\mu^{**} < \mu^H$  and  $\mu \in (\mu^{**}, \mu^H)$ , in which case a monopoly corporation is efficient and a corporation FEE exists.) On the other hand, if  $\mu < \mu^{**}$  and Condition C fails, an incumbent corporation hiring as a monopolist is vulnerable to entry by an efficient partnership with  $\lambda_L^P = 0$ , so there is no corporation FEE.

If an efficient partnership is an incumbent, note that an entering corporation cannot profitably enter by hiring the high, medium, and potentially some low entrants because it could make at most zero profits. Nor could it hire just the high workers because if the market believed it would do this, it would certainly want to add some medium workers as its marginal revenue from hiring them would exceed that of the partnership that did hire them. So the relevant entering corporation to consider is one that hires high and low ability workers. If Condition P holds, then no such entering corporation exists. If it fails, however, then there exists some profitable entrant corporation  $(\hat{\lambda}, \hat{w}, \hat{p})$  with correct beliefs and consistent hiring incentives that would disturb the partnership, and it cannot be an FEE. QED

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