A Theory of Partnerships*

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Abstract

We compare the costs and benefits of partnerships relative to the corporate form of organization. We show that organizing as a partnership can be desirable in human-capital intensive industries where product quality is hard to observe. The 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 explains features of partnerships such as up-or-out promotion systems, the use of non-compete clauses, motives for profit sharing as well as recent trends in professional service industries.

1 Introduction

Modern economies exhibit a wide diversity of organizational forms: from closely held private firms to employee-owned partnerships and co-operatives to investor-owned corporations. A fundamental economic problem is to understand the forces that lead to these different forms of organization and hence determine the structure of productive enterprise in the economy.

A striking puzzle concerns the prevalence of partnerships in a small but important subset of industries. While the corporate form dominates across manufacturing, technology and many service industries, partnerships remained the prominent organizational form in human-capital intensive professional services such as law, medicine, investment banking, management consulting, advertising, and accounting.

In this paper, we investigate an economic rationale for partnerships. We argue that in the face of market imperfections, partnerships may be more profitable than corporations. Our story has two components. First, we assume that human capital plays a crucial role in production. In particular, we assume that firms face a distribution of heterogeneous workers in the labor market, and the ability of a firm's employees determines the *quality* of its product. Second, we entertain the possibility that a firm's clients cannot perfectly perceive product quality — there is *imperfect market monitoring*.

We take the defining feature of a partnership to be re-distribution of profits among the partners. We show that under the market conditions just described, this feature of partnerships can make them a preferable mode of organization to a profit-maximizing corporation. The argument hinges on a classical observation of Benjamin Ward (1958) that relative to a profit-maximizing corporation, an equal-sharing partnership is relatively less inclined to expand its labor force. In particular, because partnerships involve re-distribution of profits, existing partners may hesitate to bring in new employees even if their marginal product is above the going wage. When a firm faces a distribution of talent in the labor market, this selectivity translates into a higher threshold for employment, and (if product quality depends on employees' ability) a higher quality product. This assurance of quality pays off when clients cannot perfectly observe in advance what they are buying. Specifically, when market observability falls below a given threshold, partnerships emerge as strictly more profitable than a corporation whose objective is to maximize profits.

This basic story is developed in Sections 2 and 3. We consider a simple model that focuses on the hiring policies of different organizations. As in Ward (1958), we assume

that a corporation wants to maximize profits, while an equal-sharing partnership would like to maximize profits per partner. In equilibrium, corporations hire up until a point where the marginal employee's contribution equals the going wage, while partnerships stop when this contribution equals the average partner share. A direct consequence is that corporations are always bigger than partnerships and have a lower average quality.

When market monitoring is perfect, partnerships provide too high a level of quality, while a profit maximizing corporation leads to efficient hiring. With less effective market monitoring, there is a temptation to reduce quality, hire less able workers, and benefit in the event that the market does not discern this loss of quality. Both corporations and partnerships suffer from this problem. However, while corporations generate less profits as market monitoring deteriorates, partnerships move closer to efficient hiring and reap more profits (though profits *per partner* decrease). This leads to the main result: if market monitoring is sufficiently strong, corporations perform better than partnerships, while if market monitoring is weak, then partnerships are the dominant form of organization.

In Section 4 we generalize our results to an environment in which salaries are correlated with ability. When higher ability workers have higher reservation wages, equal-sharing partnerships can "unravel" if the most able employees are not willing to engage in profit re-distribution. Because corporations can more freely adjust compensation, they do not suffer from this problem. We build on this observation to argue that labor market competition may disadvantage equal-sharing partnerships relative to corporations. Our analysis of labor market competition is based on a simple generaliztion of our basic model. A more complete analysis is done in Levin and Tadelis (2002), in which wage setting and industry structure are analyzed endogenously.

The model has a number of implications that can be related to the professional service industries, which we present this in Section 5. We discuss the role of up-or-out promotion systems and non-compete clauses as part of a partnership's commitment mechanism, and consider how physical capital requirements, or wealth limitations of prospective partners, might disadvantage partnerships. We connect the model with a relatively recent move away from the traditional partnership structure in investment banking and law. Finally, we discuss some costs and benefits of partnerships that are not captured in our model, but might serve as alternative explanations for features of professional service firms.

Though the literature does not offer a commonly accepted reason for why partnerships are observed in some industries but not others, several papers relate to this question. In an influential paper, Alchian and Demsetz (1972) suggested that differences in measuring

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individual productivity might lead to different organizational forms. They write that "[w]hile it is relatively easy to manage or direct the loading of trucks by a team of dock workers where input activity is so highly related in an obvious way to output, it is more difficult to manage and direct a lawyer in the preparation and presentation of a case." (p.786). From this, they conclude that such professionals will be less likely organized as traditional capitalist firms.

In his study of ownership patterns, Hansmann (1996) argues strongly against this position. He writes that "[i]n the service professions, where employee ownership is the norm, the productivity of individual employees can be, and generally is, monitored remarkably closely, because the quantity and quality of each individual's inputs and outputs can be observed with relative ease." (p. 70). Hansmann goes on to suggest that "there must be other factors that are much more important in determining the distribution of employee ownership, since the types of firms in which employee ownership is most common seem to be firms in which employee monitoring is relatively easy." (p. 71).

Our story relies on informational imperfections as an explanation for partnerships, but the monitoring problem is *not within* the firm but rather *between* prospective clients and the firm. Indeed, if one considers the employment decisions of firms as one manifestation of firm monitoring—i.e. in determining the quality of employees—then monitoring in partnerships is *endogenously* higher, in the sense that partnerships will adopt a higher threshold for employment. Thus when *market monitoring* fails, the partnership's strong incentives to monitor make it a desirable organizational form.

Our paper also relates to a large literature on labor-managed firms that builds on Ward's paper (see Bonin, Jones and Putterman, 1993, for a survey). This research concentrates largely on industrial cooperatives rather than professional partnerships. Its main focus has been on behavioral differences between labor-managed firms and corporations — in particular, the idea that labor-managed firms might react differently to price changes or other shocks. The question of why one organizational form would be chosen over another is not typically considered. Since in these models corporations are more profitable, the presence of partnerships must presumably be ascribed to an intrinsic taste for employee participation in decision making and control.

Two notable exceptions are Miyazaki (1984) and Kremer (1997).[1] Miyazaki argues that labor-managed firms may emerge in the face of short-run financial difficulties, but will convert back to a corporate form in the long run (see also Ben-Ner, 1984). Kremer

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[1] Another exception is Dow (1993), who considers a model of bargaining over quasi-rents with specific physical or human capital. We discuss several other stories in section 5.2.

(1997) argues that labor-managed firms enjoy tax advantages, but that re-distribution through majority voting distorts the effort choices of members.[2]

In our view, the "financial distress", "tax benefit" and "taste for participation" stories cannot possibly explain the observed distribution of partnerships. First, most existing partnerships in professional service industries started as partnerships, rather than converting in the face of financial distress, and many have been successful for years without switching to a corporate form. Second, and we return to this later, while partnerships have historically enjoyed some tax advantages relative to corporations, these have largely eroded over time. Finally, with a few exceptions (for instance, the Washington state plywood firms studied by Pencavel and Craig, 1993), there are few labor-managed firms in the United States outside of professional services. Thus, to apply the most basic taste for participation story, one must posit that consultants and investment bankers care more about participation and less about profits than employees of manufacturing firms.

2 A Monopoly Model

Imagine a continuum of agents, of unit measure, who have access to a production technology and must decide on an organizational form. They can either organize as a corporation or as a partnership. We define a corporation in the standard neoclassical sense, as an entity that maximizes profits and must pay employees at least their reservation wage. In a partnership, members share profits equally. We think of the choice of organization as being made "behind the veil of ignorance" — that is, at some ex ante date when agents are symmetric and their productive abilities have yet to be realized. Because of this, optimal organizational form will maximize ex ante net economic surplus, which equals profits plus wages.

Once organizational form is chosen, agents realize their productive abilities. Let agent i's ability be a_i, and suppose that abilities are distributed on the interval $[\underline{a}, \overline{a}]$ with continuous distribution $F(\cdot)$ and positive density $f(\cdot)$. Agents have access to an outside labor market that pays a fixed wage $w \in (\underline{a}, \overline{a})$, independent of ability. We consider ability-dependent wages in the next section.

The production technology requires a fixed capital cost $K > 0$. If a (measurable) set A of agents are employed, the firm can produce a quantity $|A|$ (the probability measure

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[2]Hansmann (1996) also argues that co-operatives will face decision-making problems if their membership is heterogeneous. Hart and Moore (1998) provide a model in which voting leads to ineffiency in consumer co-operatives.

of A). Its product quality equals the average ability of agents in A:

$$q(A) = \frac{1}{|A|} \int\limits_{\tilde{a} \in A} \tilde{a} dF(\tilde{a}).$$

The market for the firm's services is composed of a large number of identical clients. Each places a value on the firm's services equal to the expected quality of service. Thus, if the market knows that the firm has employed a set A of agent, 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 firm's quality only with probability μ. With probability $1 - \mu$, the market cannot assess quality and instead forms an expectation A^e. Thus, depending on the market's information the market price commanded by the firm is either $p(A)$ or $p(A^e)$.

This simple formulation of information abstracts from important issues of signalling 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 μ is higher, demand tracks more closely the firm's actual choices as opposed to the market's beliefs. We thus interpret μ 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.

Now suppose that the market correctly anticipates the firm's hiring choices (as will happen in a rational expectations equilibrium) or alternatively that $\mu = 1$. The firm's economic profits, or revenues net of capital costs and employees' opportunity costs, can be written as:

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

Economic profits are maximized by employing all agents 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 $A^{FB} = [w, \overline{a}]$, then $\Pi(A^{FB}) > 0$. We also assume that if the firm simply hires every agent, it will make negative economic profits, i.e. $\Pi([\underline{a}, \overline{a}]) \leq 0$.

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Given this description, we now characterize the *equilibrium* behavior of corporations and partnerships. We consider the following game between the firm and the market. The agents first choose organizational form and learn their abilities. Once organizational form is announced, the market forms an expectation A^e of who will be employed. Given market beliefs, the firm makes hiring decisions and selects A, which the market then learns with probability μ. Finally, the market price is set and the firm produces. We consider the *rational expectations equilibrium* for both a corporation and a partnership, then consider the optimal choice of organizational form.

2.1 Corporation Equilibrium

A corporation makes hiring decisions to maximize profits. Since agents command the same outside wage, and since 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 want to select the most qualified agents. Thus its optimal hiring strategy must be to choose a threshold a and employ agents with abilities above a.

A higher threshold decreases quantity but increases quality. Slightly abusing our previous notation, let quality with threshold a be denoted:

$$q(a) = \frac{1}{1 - F(a)} \int_a^{\overline{a}} \tilde{a} dF(\tilde{a}),$$

while quantity is $1 - F(a)$. With similar notational abuse, let $p(a)$ denote the price if the market is informed, and $p(a^e)$ the price if the market has conjecture a^e.

Given market beliefs a^e, the firm will want to choose its hiring threshold to maximize expected profits:

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

The first order condition for a to be an optimal threshold is that:

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

The corporation's optimal policy is to hire up to the point where the *expected* marginal product of the agent being hired is exactly equal to the wage. As the marginal product of each successive employee is decreasing, the hiring optimum is unique.[3]

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[3]If μ is sufficiently low, or beliefs are sufficiently optimistic, the first order condition may not hold for any $a \in [\underline{a}, \overline{a}]$. In this case, the unique solution is the corner solution $a = \underline{a}$.

In a rational expectations equilibrium, 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 equilibrium hiring threshold:

$$\mu a^C + (1 - \mu)p\left(a^C\right) = w. \tag{1}$$

There is a natural relationship between market monitoring and hiring decisions. 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 $a^C < a^{FB}$.

Should it choose to operate, the corporation's equilibrium profits will be:

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

The corporation will want to operate in equilibrium if and only if $\Pi\left(a^C\right) > 0.$[4]

2.2 Partnership Equilibrium

In a partnership, each partner receives an equal share of profits. 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:

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

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

Given that the market price decreases in quality, and that agents command a uniform outside wage, it seems reasonable that a partnership will choose a threshold for partnership in the same way a corporation chooses a threshold for employment. To obtain such

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[4]This statement implicitly supposes a weak sequential rationality condition on how beliefs are formed in equilibrium. The subtlety is the following. If $\Pi\left(a^C\right) > 0$, there is of course an equilibrium in which the firm operates, but (for levels of $\mu < 1$) there may be as second Nash equilibrium in which the firm chooses not to operate, and this behavior is supported by the market's belief that if the firm did choose to operate it would make a sub-optimal hiring choice (for instance — hire only the least qualified workers). We maintain the natural assumption that if the market sees the firm in operation, it believes the firm will make rational (i.e. optimizing) decisions. This sequential rationality requirement gives a unique equilibrium.

a characterization, we introduce the notion of *stability*. A stable partnership satisfies three natural requirements: First, individual rationality suggests that partners should get a share of profits that exceeds w. Second, no majority of partners should want to dismiss a minority of partners. Third, the partnership should not want to increase its base by admitting more partners. Formally,

Definition: A partnership $A \subset [\underline{a}, \overline{a}]$ is *stable* if $s(A, A^e) \geq w$, and there do not exist $\varepsilon, \delta \geq 0$ such that a majority of probability measure $|A| - \varepsilon$ benefits by replacing a measure ε of members with a measure δ of non-members, each of whom is willing to join.

A straightforward argument shows that the only stable partnership will be the interval of agents $[a, \overline{a}]$ that achieves the maximum share per partner, subject to this share being above w.[5] Therefore, given market beliefs, the stable partnership solves:

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

The first-order condition for this problem 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 solution.[6]

Combining partnership optimization with rational expectations yields an expression for the partnership's unique equilibrium hiring threshold a^P:

$$\mu a^P + (1 - \mu) p\left(a^P\right) = p\left(a^P\right) - \frac{K}{1 - F\left(a^P\right)}. \tag{2}$$

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.

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[5] 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 per-partner profit share. 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 $[a, \overline{a}]$. From here, observe that if all partners of ability $a' > a$ could increase their average share from dropping those of the lowest ability, the would choose to do so.

[6] If μ is sufficiently low then it may be optimal for the partnership to choose $\underline{a}$.

The partnership's economic profits are equal to

$$\Pi(a^P) = [1 - F(a^P)] \cdot [s(a^P, a^P) - w] \ . \tag{3}$$

The partnership will be viable only if $\Pi(a^P) > 0$.

3 The Costs and Benefits of Partnerships

3.1 Comparative Analysis

Our first result compares the hiring incentives of a corporation and a partnership.

Proposition 1 *For any level of market information $\mu \in [0,1]$, and any market beliefs that allow for positive profits, a corporation will choose a lower hiring threshold than a partnership.*

Proof. 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 $a^P > \underline{a}$). *Q.E.D.*

Proposition 1 has a natural logic that echoes Ward's (1958) analysis. If adding a given agent increases the average economic profits *per employee*, then adding that agent must strictly increase the total economic profits. It follows that whatever hiring threshold a partnership sets, a corporation would prefer a lower threshold.

Our next result shows that this logic carries over from the firm's optimization problem to the equilibrium problem, and furthermore that corporations and partnerships will make identical shut-down decisions in equilibrium.

Proposition 2 *There is some $\underline{\mu} \in (0,1)$ such that both the corporation and partnership will be profitable in equilibrium if and only if $\mu > \underline{\mu}$. If $\mu > \underline{\mu}$, the corporation sets a strictly lower equilibrium hiring threshold, i.e. $a^C < a^P$.*

Proof. By the definition of profits, for any $a \in [\underline{a}, \overline{a}]$,

$$\Pi(a) \gtreqless 0 \qquad \Leftrightarrow \qquad p(a) - \frac{K}{1 - F(a)} \gtreqless w. \qquad (4)$$

Notice that the LHS of both equilibrium conditions (1) and (2) is the same, and it is increasing in a. Furthermore, notice that for a given a, the RHS of (2) is greater (less) than the RHS of (1) if and only if profits are positive (negative). Combining (2) with (4) we obtain:

$$\Pi(a^P) \gtreqless 0 \qquad \Leftrightarrow \qquad a^P \gtreqless a^C,$$

and combining (1) with (4) we obtain:

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

We conclude that for any given μ, $\Pi(a^P)$ has the same sign as $\Pi(a^C)$. That is, if the partnership obtains positive profits, so does the corporation and vice versa. To consider whether either is profitable for a given μ, it thus 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 $a^C = \underline{a}$ and $\Pi(\underline{a}) \leq 0$. As a^C is strictly increasing in μ, and $\Pi(a)$ is strictly increasing in a on $[\underline{a}, a^{FB})$, then there exists some $\underline{\mu} \in (0, 1)$ such that the corporation will operate for all $\mu > \underline{\mu}$. $\qquad$ *Q.E.D.*

As μ decreases from 1 to $\underline{\mu}$, a^C decreases from a^{FB}, and $\Pi(a^C)$ decreases from maximal profits to zero, while a^P decreases from some level above a^{FB}, so $\Pi(a^P)$ first increases up to maximal, and only then decreases to zero. This gives:

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 $\mu \in (\hat{\mu}, 1]$.*

Proof. 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

$$\mu = \mu^P = \frac{K}{\Pi(w) + K},$$

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 $\Pi(a^C) \gtreqless \Pi(a^P)$ whenever $\mu \gtreqless \hat{\mu}$. $\qquad$ *Q.E.D.*

It is interesting to examine how changes in the environment affect the relative profitability of corporations and partnerships. In particular, consider an increase in the fixed costs of production, K. This will leave the corporation's hiring decision's unchanged, but give partnership's a stronger incentive to increase hiring (in order to spread the fixed cost across more employees). It follows that an increase in the fixed costs of production will tend to increase the range of μ's for which partnerships dominate corporations. This conclusion should be interpreted with some care, however. It does not imply, for instance, that partnerships are preferable if capital becomes more important as a marginal or variable factor of production.[7]

3.2 Discussion

Our results rest on three assumptions. First, there is a distribution of talent in the labor market, so that the marginal employee hired is of lower ability than the average hire. 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, but are not able to signal in other ways, for instance by paying above-market wages.

The trade-off between quantity and quality that results from the first assumption, and the effect of imperfect information, can be placed squarely in the context of standard monopoly theory. Think of the firm as choosing a quantity x rather than a hiring threshold. Of course, 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 quantity (quality), and $p(x^e)$ be the price when the market does not and instead believes the hiring threshold is $a(x^e)$. The firm's costs, in terms of quantity, are $w \cdot x + K$. Letting $MR(x) \equiv \mu x + (1 - \mu) p(x)$ denote the *rational expectations marginal revenue*, we have a twist on the standard monopoly problem.

Figure 1 provides an illustration. For a corporation, the equilibrium quantity x^C equates the rational expectations marginal revenue to the market wage w. In contrast, for a partnership, the equilibrium quantity x^P equates the rational expectations 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

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[7]It is not particularly hard to extend the model to more general production functions that depends on both capital and labor inputs. In this case, whether or not an increase in the importance of capital will tend to increase or decrease the range of μ's for which corporations dominate depends on the relationship between capital distortions and the direction in which labor decisions are distorted (they are distorted upward by a corporation, but potentially downward by a partnership).

$\mu = 1$ are denoted in Figure 1 by $x^{C,1}$ and $x^{P,1}$. This is precisely the problem studied by Ward (1958) — as he observed more than four decades ago, the result is that the corporation earns higher profits.

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

The third assumption driving our result is that a partnership operates as a commitment to equal profit-sharing, while a corporation cannot commit to a specific wage policy. To see why this is important, suppose that the firm could commit to some $w' > w$. As seen in Figure 1, with $\mu < 1$ as suitable choice of w' can ensure that the equilibrium quantity is $x = x^{FB}$ giving first-best profits. This particular commitment strategy might not increase profits, but it illustrates the general point that by committing to a high wage the corporation can guarantee a higher quality than $p(a^C)$.[8]

A commitment to paying even new or marginal employees above market wages seems difficult to maintain in practice however. A worker who is left unemployed due to the higher wage w' would be willing to accept an offer of $w + \varepsilon$ and would have no incentive to reveal this lower offer to the market. Thus, the market should rationally anticipate that firms will renege on their stated wage policy if possible, and hiring decisions will unravel to be those in the solution above. In contrast, organizational form is usually better observed. Once a partnership is formed and a charter is written, organizational changes are likely to be observed by the market.[9]

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[8] There can be other mechanisms that play a similar role. For example, Enterprise Rent-a-Car has committed to hiring only college graduates, creating a reputation for high quality service.

[9] Historically, there has also been a question of whether having a legal status as a partnership *necessitates* profit-sharing. If parties organize as a partnership, equal sharing of profits is the legal default, but this default can be contracted around. As late as the 1950s, however, firms lost their legal partnership status for attempting to depart too radically from equal-sharing. Things have changed over time, however. Our understanding is that from a legal standpoint, a partnership today could be structured to achieve virtually any form of sharing among the partners.
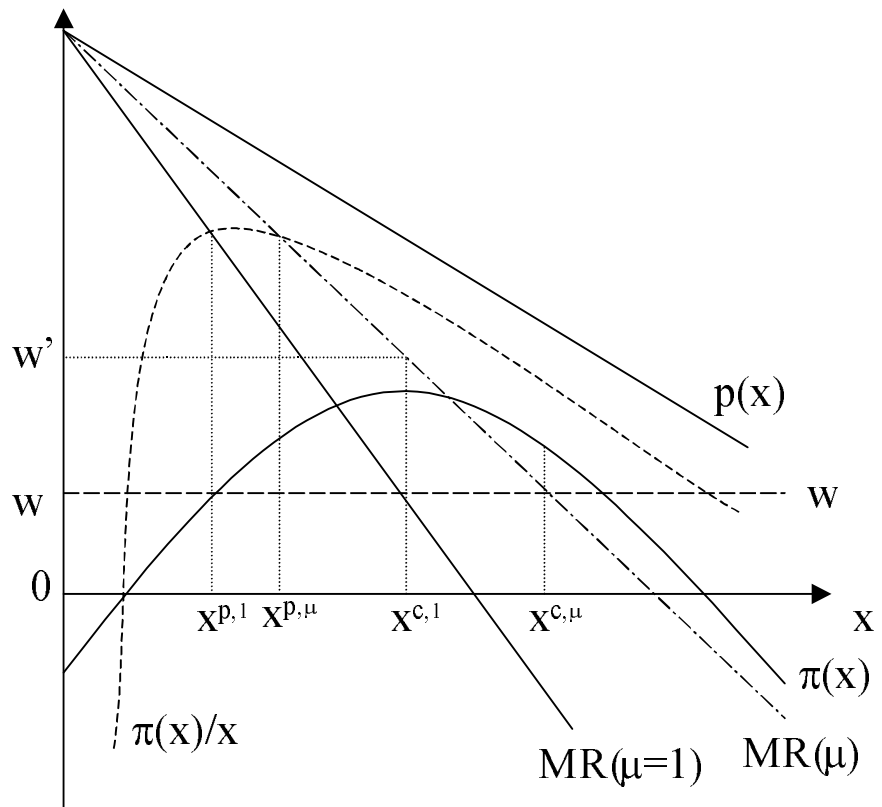
p(x)

w'

w   w

0

$X^{p,1}$ $X^{p,\mu}$ $X^{c,1}$ $X^{c,\mu}$

x

$\pi(x)$

$\pi(x)/x$

MR(μ=1)   MR(μ)

Figure 1: Graphical Analysis

4   Labor Market Competition

The model assumes that outside wages are not sensitive to an agent's ability. As a result, firms have a very strong wage-setting position vis-a-vis talented employees. In this section, we relax this assumption. While our main results remain intact, some new insights emerge regarding the relationship between labor market competition and organizational form.

We approach the problem of competition for talented workers in two steps. We first consider the problem of equilibrium hiring when reservation wages depend on workers' abilities. We observe that corporations can adjust to this by raising the salaries of more talented employees (which lowers profits). In contrast, equal-sharing partnerships cannot adjust salaries in this way and as a result are susceptible to "unraveling" if the most able workers opt for higher outside salaries. We then ask under what conditions a partnership will be susceptible to acquisition by an outsider who would convert it to corporate form.

4.1   Ability-Dependent Wages

To extend the model, suppose that wages are given by $w(a)$, where:

$$w(a) = \begin{cases} w & \text{if } a < \hat{a} \\ w + \lambda(a - \hat{a}) & \text{if } a \geq \hat{a} \end{cases}$$

Here, $w \in (\underline{a}, \overline{a})$ can be thought of a baseline salary available to any agent. The parameters $\hat{a} \in [w, \overline{a}]$ and $\lambda \in [0, \mu]$ define the relationship between ability and reservation wages and hence proxy for a form of labor market competition. Our previous model corresponds to the case where $\lambda = 0$ (or $\hat{a} = \overline{a}$). A higher value of λ means a tighter relationship between reservation wages and a worker's marginal product — high ability workers can demand a larger fraction of their contribution. A lower value of $\hat{a}$ means that this relationship extends further down the ability spectrum. Note that we assume $\lambda \leq \mu$. With imperfect information, μ is the firm's marginal profit to increasing worker ability, so a steeper wage schedule of this form seems less reasonable.[10]

If a firm adopts a hiring threshold a, and the market correctly anticipates this decision, then economic profits are:

$$\int_a^{\overline{a}} (a - w(a)) dF(a) - K.$$

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[10]In Levin and Tadelis (2002) we endogenize the wage $w(a)$ using a model with U-shaped average cost, and a free entry condition. The model also analyzes market equilibrium structure with free entry.

With this more general formulation of wages, efficiency still dictates that all workers of ability $a \geq w$ be hired. So long as λ is sufficiently low ($\hat{a}$ sufficiently high), a firm that hires efficiently will be able to operate at a profit.

4.1.1 Corporation Hiring

Consider the problem facing a corporation. Given a market expectation p^e, the corporation's best hiring policy is to employ all workers whose ability is above some threshold a. To see why such a threshold policy is optimal, note that the marginal profit from hiring a worker of ability a is $\mu a + (1 - \mu)p^e$ while the cost is $w(a)$. Since $w'(a) \leq \mu$, if it is profitable to hire a worker of ability a, it must also be profitable to hire all workers of ability $a' > a$.

The corporation will choose its hiring threshold to solve:

$$\max_a \int_a^{\overline{a}} \left(\mu \tilde{a} + (1 - \mu)p^e - w(\tilde{a}) \right) dF(\tilde{a}) - K.$$

This leads to a first order condition:

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

As before, the corporation hires up until the point that the marginal revenue from adding an employee of ability a just equals the wage. Combining this with the rational expectations equilibrium requirement that $p^e = p(a)$ gives an equation for the equilibrium hiring threshold:

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

Using the fact that $\lambda \leq \mu$, it follows that the equilibrium hiring threshold must be precisely the same a^C as in our earlier formulation.

4.1.2 Partnership Hiring

To consider the problem of partnership formation, we first note that our definition of a stable partnership can be directly extended. Given an expectation p^e, a partnership A is stable if (i) the resulting partnership share is greater than the outside wage of each partner, and (ii) no majority in the partnership would benefit by dropping some measure δ of existing partners and replacing them with a measure ε of new partners, each of whom is willing to join.

It is easy to see that any stable partnership must be an interval.[11] In fact, if the distribution of abilities F is linear or convex, the unique stable partnership (if one exists) coincides exactly with the partnership that forms with constant wages.

Proposition 4 *The partnership comprised of agents in the interval $[a^P, \overline{a}]$ is stable if and only if $s(a^P, a^P) \geq w(\overline{a})$. If F is linear or convex, this is the unique stable partnership. If F is concave, a lower interval may be stable even if $s(a^P, a^P) < w(\overline{a})$.*

An important observation is that an increase in labor market competition affects partnerships quite differently from the way it affects corporations. While corporations react by paying their employees more — thus reducing total profits — the share offered by an equal-sharing partnership does not change. However, when the labor market distinguishes more clearly between agents of different abilities, re-distribution of profits becomes more difficult to sustain. As a result, a partnership may unravel as the best partners opt out. Under some conditions (F weakly convex), the unravelling is complete in the sense that once the $\lambda = 0$ partnership is infeasible all others are also infeasible.

4.1.3   Comparing Partnerships and Corporations

To compare partnerships and corporations when wages are ability-dependent, observe that a corporation will generate higher economic profits if and only if:

$$\int_{a^C}^{\overline{a}} (a - w(a))dF(a) - K \geq \int_{a^P}^{\overline{a}} (a - w(a))dF(a) - K. \tag{5}$$

Beyond relative profitability, there is also the issue of absolute profits and feasibility. For a corporation to be profitable, it must be that the left hand side of (5) is positive, or alternatively that:

$$\Pi(a^C) \geq \lambda \int_{\hat{a}}^{\overline{a}} (a - \hat{a})dF(a).$$

On the other hand, for the partnership to be feasible, not only must that the right hand side of (5) be positive, it must be that $s(a^P, a^P) \geq w(\overline{a})$, or alternatively that

$$\Pi(a^P) \geq \lambda[1 - F(a^P)]\,(\overline{a} - \hat{a})\,.$$

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[11] To see this, note that given any market expectation, if a and a'' are included, but a' is not, where $a < a' < a''$, then by replacing some or all members of ability a with new partners of ability a', the average share can be increased. Morever, as the previous share was greater than $w(a'')$ then the new share will certainly be greater than $w(a')$.

If $\hat{a} \geq a^P$, a clear comparison results between the two forms of organization. In this event, $w(a) = w$ for all agents who are employed by the corporation but not the partnership. As a result, the corporation is more profitable if and only if $\Pi(a^C) > \Pi(a^P)$, or equivalently if $\mu > \hat{\mu}$. Moreover, given $\mu > \hat{\mu}$, then for any level of λ at which a partnership is feasible, a corporation will also be feasible. At the same time, there will often be a range of values of λ for which only a corporation will be feasible. Moreover, such a range of λ's will typically occur even if $\mu \in (\underline{\mu}, \hat{\mu})$. In these situations, a partnership would in principle generate greater profits, but because of the unravelling problem, only a corporation will be feasible. In this sense, labor market competition disadvantages partnerships.

If $\hat{a} \in [w, a^P]$, the comparison is slightly more complex. In this case, there is labor market competition even for those agents who would only be hired by a corporation. For this reason, an increase in λ will reduce corporation profits by more than it reduces partnership profits. If $\lambda = 0$, the corporation will be more profitable if and only if $\mu > \hat{\mu}$, but if $\lambda > 0$, the range of μ's for which the corporation is more profitable is reduced. At the same time, however, there is a competing effect due to feasibility. Given μ, an increase in λ increase the reservation wage of the highest type workers and hence promote unravelling. So there will again be regions of the parameter space for which a partnership is more profitable, yet only a corporation is feasible (including regions where $\mu < \hat{\mu}$).

4.2 Partnerships and Acquisitions

In the previous subsection, we saw that labor market competition in the form of ability dependent reservation wages could potentially disadvantage partnerships. An alternative way to approach this issue is to ask the following question: under what conditions would a stable partnership be willing to sell itself to a buyer who would convert the firm to corporate status?

As a start, imagine the most stringest possible condition for a sale. Suppose that the acquirer must be willing to offer a wage scheme $w(a)$ such that *every* member of the partnership would be willing to sell. Of course, having purchased the partnership, the acquirer generally will have an incentive to hire additional agents. For simplicity, suppose these agents all have a reservation wage w. Say that a partnership is *susceptible to entry* if an acquirer can approach the partnership with an acceptable offer, make additional optimal hires, and given that the market correctly anticipates these additional hires, still

make a positive profit.

Observe that once the acquirer has purchased the partnership, the only hiring that could be consistent with rational expectations is to hire all agents between $[a^C, a^P]$ so that the resulting corporation employs all workers with abilities above a^C. Thus, the eventual economic profits (neglecting wages above w paid to earlier members of the partnership) are $\Pi(a^C)$. These must be sufficient to compensate members of the partnership for their foregone share above w. It follows that a stable partnership is susceptible to entry if and only if $\Pi(a^C) > \Pi(a^P)$, or in other words if $\mu > \hat{\mu}$.

This stringent buy-out condition is conceptually consistent with a dynamic model in which overlapping generations of agents enter a firm, some are promoted to partner, and then grow old in the firm. If, as one can imagine, young workers accept low initial wages to "buy in" to partnerships, then a majority of more senior partners, who are closer to retirement, would possibly like to "sell out" their younger counterparts.

Of course, this is the very best case for a partnership to deter entry. If we depart from the stringent unamimity requirement, a corporate entrant might be able to skim only the best partners, leading to unravelling. Although certain partnership covenants (such as non-compete clauses as we discuss below) might make it difficult to cream-skim, it is quite plausible that even for values of $\mu < \hat{\mu}$, the partnership may not be sustainable in the face of labor market competition.

5   Discussion

In this section we relate the model to some stylized empirical facts and in particular to some recent changes in professional service firms. We then discuss a few aspects of partnerships that are ignored by our model.

5.1   Empirical Implications

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. Our model explains this by showing that the combination of significant quality uncertainty on the part of clients and a close relationship between human capital and quality (two features that we believe characterize the professional services) make partnerships a desirable form of organization.

The prevalence of partnerships in the professional services dates back at least to the

beginning of the twentieth century. Interestingly, however, the past two decades have seen striking organizational changes in some of these industries. We briefly discuss these changes in light of our theory.

Profit Sharing in Law Partnerships

There is evidence that law firms increasingly have moved away from the traditional method of lock-step or seniority-based profit-sharing (the so-called "Cravath model") in favor of productivity-based, "eat-what-you-kill" forms of profit-sharing (Altman Weil, 2000). These changes have made firms less like the partnerships we have modeled and more "corporate." Our analysis suggests at least two potential explanations — a more competitive labor market that makes re-distribution infeasible, or a change in market information that makes a commitment to equal-sharing less valuable.

Though we do not know of a comprehensive empirical study, there is anecdotal evidence of a competitive trend in the labor market for lawyers. Gilson and Mnookin (1985) suggest that one cause of this has been the changing role of in-house counsel. "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." (p. 382) If this change has led to a more active market for senior lawyers, our analysis suggests that top lawyers in firms with equal-sharing compensation would soon become unhappy and might credibly threaten to leave if compensation practices were not altered. Interestingly, Gilson and Mnookin observe that a second consequence of better in-house counsel is that firms become more discriminating consumers. If one interprets this as better monitoring in the context of our model (a higher μ), this generates a second force pushing toward a more corporate form in the legal profession.

Beyond the changing role of in-house counsel, another change in the legal profession that has coincided with changes in the sharing structure of partnerships is an increase in litigation awards. To the extent that this might allow litigators to credibly demand larger salaries — for instance, by threatening to start their own firms — this change could also lead to the sort of potential unravelling we considered in the previous section. Thus, this might be an alternative explanation for the move away from equal sharing due to the increased earing power of a subset of partners.

Law firms are not the only professional service firms to become more corporate in recent years. In the 1980s, and starting even earlier, virtually all the major invest-

ment banks 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 consider whether larger capital requirements might also favor the corporate form.[12]

Up-or-Out Promotion Schemes

Gilson and Mnookin (1985, 1989) report that the change in law firm profit sharing was accompanied by a striking relaxation of the traditional "up-or-out" promotion scheme. As they put it, "firms are creating new categories of employee lawyers ... permanent associate, staff lawyer, special council, non-equity partner, junior partner." (Gilson and Mnookin, 1989 p.567). To discuss these trends, we need to take a more dynamic view of our modelling approach.

If we consider a professional service industry as one in which the actual talent of young employees is learned during some initial employment period, then current management needs some time to assess the quality of their employees. In an earlier version of this paper, we used this approach to re-interpret the threshold employment strategy in our model as a threshold for promotion rather than hiring, with the change that it was applied only after employees went through some "associate" period. Viewing the model in this light, the up-or-out promotion scheme is 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 that 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 re-distribution (e.g. move toward more productivity-based compensation), the title of partner becomes less meaningful and

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[12]Interestingly, many advertising partnerships sold out at a similar point in time (and there was significant growth of the public firms). There have been significant changes in the structure of medical practices. A full discussion of these changes is beyond the scope of this paper.

the up-or-out system becomes less important. In this sense, we can view the new category of employee lawyers as entirely consistent with the trend toward more competitive corporate compensation schemes.[13]

Non-Compete Clauses

A non-compete 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 a non-compete clause in their contracts.[14] One possible role of a non-compete clause might be to mitigate a hold-up problem in general human capital investment. For example, if a law firm's investment in training an associate would be lost if the associate leaves, a non-compete clause might prove useful. However, these clauses are mostly signed when employees join as partners or are promoted to partner.

Our model suggests a different interpretation. Namely, a non-compete clause might help to prevent a partnership from unravelling. Of course, if an employee's ability was generally known to the labor market at the time of promotion, he would demand at least his outside wage as a condition for becoming a partner in a given firm. However, if there was residual uncertainty, or if other firms did not have the same information as his current firm, a prospective partner might be willing to sign a non-compete clause that could eventually become binding in the event that the labor market's perception of him increased. In such an environment, a non-compete clause can play an important role: by preventing the most able partners from leaving easily, they protect the partnership against the danger of unravelling.[15]

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[13]Kahn and Huberman (1988) propose a different role for up-or-out schemes by showing that they can mitigate a form of hold-up involving human capital investment. However, they do not have results suggesting that we should see this form of promotion in partnerships but not corporations.

[14]A recent and highly publicized example is Arthur Andersen. Non-compete clauses are particularly common in medical practices. It is sometimes argues that non-compete clauses violate antitrust law, however, this seems not to be the case for partnerships. An example is the case of Rash v. Toccoa Clinic Med. Assoc., 253 Ga. 322, 320 S.E.2d 170 (1984), in which the Georgia Supreme Court argued that professional partnerships agreements should receive particular leeway to make mutually beneficial covenants as the partners are in an equal bargaining position. In Rash, the court upheld an agreement that prohibited physicians in a medical practice from leaving to practice with twenty-five miles of Toccoa, Georgia, for three years (see Grady, 1997).

[15]If at the time of promotion employees and their firms knew the true ability, but competitors did not, this would still call for type-dependent compensation above and beyond non-compete clauses. A more compelling argument might be that at the time of promotion, firms and their associates know more

Capital Requirements

A notable feature of many professional service firms is that they are not capital-intensive.[16] Thus, one might ask whether capital requirements are responsible for the distribution of partnerships across industries. Of course, in our model, firms are entirely self-financing. However, if capital requirements were sufficiently large that firms needed to raise capital from outside investors, then to the extent that partnerships might be at a disadvantage in raising funds, this would push toward a corporate form in capital-intensive industries.

However, supposing that a compelling story could be provided for why partnerships would be unable to raise funds (and indeed partnerships such as Goldman Sachs in the 1980s have been able to raise large amounts of equity finance), our impression is that capital requirements *alone* also cannot explain the distribution of partnerships. For instance, there are many industries with relatively small capital requirements where the corporate form is standard. One example is the software industry, which has very low capital requirements, but to our knowledge few (if any) partnerships.[17]

Our model can shed some light on the disadvantages of mixed organizational form with investor financing. If a partnership would sell of a minority stake in the firm, then these investor stakeholders would have a conflict of interest with the remaining partners. In particular, the non-partner stakeholders would like the partnership to expand at the cost of lower quality, but the partners would not.

5.2   Other Costs and Benefits of Partnerships

We now turn to a few issues concerning partnerships that are neglected in our modelling approach.

Taxes and Legal Constraints

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than the outside market (e.g., "you are above the cut"), but there is still uncertainty about how good the associate is. In this case each promoted associate will receive the same compensation share, but non-compete clauses will still be important to prevent future unraveling.

[16]The most notable exceptions are medical partnerships, which sometimes have significant capital in the form of specialized equipment. To the best of our knowledge, in many cases this equipment is leased.

[17]In light of our model, one can argue that 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).

Hansmann (1996, p. 85) briefly entertains and quickly dispenses one possible argument for the scarcity of partnerships — the possible lack of a favorable legal structure for sustaining them. Interestingly, there is at least one case where legal constraints operate in the other direction. In most states, law firms are prohibited by law from having "layman" equity investors (though they need not be wholly owned by their practicing partners).

This might suggest that law firms are not organized as partnerships by choice, but rather by legal constraint. It is important to recognize, however, that this constraint stems 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' view in that we argue that partnerships will give rise to a higher quality than corporations. Of course, under some conditions, partnerships also have the benefit of generating not just higher quality for clients, but higher profits for lawyers.[18]

Tax law also distinguishes between partnerships and corporations, and hence provides another possible motive for choosing an organizational form. Indeed, relative to a corporation, partnership are free from the corporate income tax, and thus can avoid the "double taxation" that results from paying both this tax and individual taxes on dividends. (Note that this distinction is relative to C class corporations; S class corporations are taxed in the same way as partnerships.) However, while this distinction might be important for certain investment vehicles, it seems highly unlikely that it is solely responsible for the observed distribution of partnerships across industies. In particular, these tax advantages apply to all sectors, rather than just the professional sectors.[19]

Internal Incentives

Our model completely ignores the problem of internal incentives: providing employ-

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[18]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.

[19]Moreover, in recent years the tax code has evolved in such a way that corporations and partnership can practically face the same type of tax schedules given that they are carefully designed. (We thank Joe Bankman from the Stanford Law school for this information.)

ees with the motivation to work hard toward the firm's goals. It it well known that sharing output among a team of partners can cause a free-rider problem that results in inefficient incentive provision (Holmstrom, 1982). Alchian and Demsetz (1972) argue that by placing ownership in the hands of a central monitor, these problems can be mitigated. From this perspective, one might argue that an investor-owned corporation might provide better incentives than a profit-sharing partnership.

Kandel and Lazear (1992) argue that this free-rider analysis misses an important point about many actual partnerships — the effect of informal incentive mechanisms such as peer pressure. They suggest that these forces can significantly mitigate free-riding. A key observation in their paper is that peer pressure should work best when partners are of similar type and ability. This provides an incentive-based explanation for why lawyers partner with other lawyers, cardiologists with cardiologists, and so on. However, for their theory to explain the basic empirical pattern of partnerships, one would have to argue that sociological motivators such as guilt and shame, and the ability to peer monitor, differ across industries so that forces that operate in professional services are missing in manufacturing. While such sociological differences might exist in practice, we suspect that this may be as much a function of the different organizational forms than it is a cause for organizational design.

Limited Liability

A prominent feature of the traditional partnership is the unlimited liability of the partners. In theory, the presence of unlimited liability might make partnerships either less or more attractive. Unlimited liability places partners at increased risk of financial ruin, but it also provides clients with a strong signal of the partners' belief in their own ability. The empirical importance of unlimited liability, however, is unclear. For once, the vast majority of current partnerships are limited liability partnerships (LLPs). Unlimited liability partnerships are rarely seen in the professional services although firms do have the option of choosing to organize with unlimited liability. It is also the case that prior to the introduction of LLCs as a legal entity in the earlier 1970s, partnerships were able to purchase liability insurance (unfortunately, we haven't seen evidence on how widespread this insurance was).

6 Conclusions

In this paper, we consider firms in which production is based on human capital. When there is a trade-off between the quantity and quality of production, then relative to standard profit-maximizing corporations, partnerships will be relatively less inclined to expand their labor force, resulting in a higher level of quality than is dictated by profit maximization. This quality commitment pays off in a market where clients cannot perfectly observe in advance what they are buying.

We used this insight to show that in market's 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 in upsetting partnerships, and used the model to explain features of partnerships such as non-compete clauses and up-or-out promotion. Our model does not, however, address the interbal structure of production in firms, in particular, the allocation of client work within a partnership or corporation. A step in this direction is taken by Garicano and Santos (2001).

Appendix

Proof of Proposition 4. Fix a market expectation p^e and consider a candidate partnership $A = [a, a']$ that satisfies:

$$\mu p(A) + (1 - \mu)p^e - \frac{K}{|A|} \geq w(a').$$

The left side of the inequality is the resulting partner share, so it implies that each individual is willing to participate. We consider whether this partnership would want to drop its worst members and replace them with better members. In particular, consider the alternative partnership $A^* = [a + \varepsilon, a' + \varepsilon']$, where $\varepsilon' > 0$ and $\varepsilon > 0$ is chosen so that:

$$F(a' + \varepsilon') - F(a + \varepsilon) \equiv F(a') - F(a),$$

that is so that $|A^*| = |A|$. If F is linear or convex, then $\varepsilon \geq \varepsilon'$ and furthermore $p(A^*) - p(A) \geq \varepsilon'$. As a result, the change increases the share of each partner by at least $\mu\varepsilon'$, while the increase in the outside wage of the highest ability partner is only $\lambda\varepsilon' \leq \mu\varepsilon'$. Thus, all agents in the interval $[a + \varepsilon, a']$ would like to make the change and those in $[a', a' + \varepsilon']$ would be willing to join.

Thus, if F is weakly convex, an upper interval $[a, \overline{a}]$ is the only possible stable partnership. We already have seen that $[a^P, \overline{a}]$ is the only choice consistent with both rational expecpectations and the optimal choice of a lower threshold for hiring. If $s(a^P, a^P) \geq w(\overline{a})$, this partnership is the unique stable partnership, and otherwise no partnership can be stable.

For the case where F is concave, consider the partnership that might emerge if the firm was constrained not to hire any agent of ability above a' for some $a' \in (w, \overline{a})$. We ask what partnership might form if the lower threshold for hiring is chosen to maximize the average partner share (a necessary condition for stability) and the market has rational expectations about the choice of this lower threshold.

The lower threshold a is found by equating the marginal profit from hiring a worker of ability a with the equilibrium share of the partnership $[a, a']$:

$$\mu a + (1 - \mu)p([a, a']) = p([a, a']) - \frac{K}{F(a') - F(a)}$$

Denote the solution as $a(a')$. Of course, the partnership $[a(a'), a']$ could only operate if $s([a(a'), a']) \geq w(a')$. If F is weakly convex, or not "too concave," then if this inequality fails for some a' it will fail for all lower values of a'. However, if F is sufficiently concave,

this participation inequality might hold for some a^*, but fail for all $a' > a^*$. In this case $[a(a^*), a^*]$ will be a stable equilibrium partnership, but no higher interval will be stable. Q.E.D.

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