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Limited Liability and the Organization of Legal Services

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**Authors**
Talley, Eric
Romley, John A.

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# Limited Liability and the Organization of Legal Services[*]

John A. Romley
RAND Corporation
*romley@rand.org*

Eric Talley
Boalt Hall School of Law
RAND Corporation
*etalley@law.berkeley.edu*

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**Abstract**

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During the 1990s, almost all states introduced business forms for law firms that limited owners' liability. We develop a principal-agent model in which relatively large firms profit from decreased liability, as clients elicit attorney effort through increased compensation. Our model also implies that smaller firms may grow after reorganizing in order to gain leverage over clients; larger firms may shrink to ensure that clients remain willing to pay for effort. We then test our model against a national panel data set of practicing attorneys at two points in time. We find that the data is consistent with our predictions in many (but not all) respects.

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# 1　Introduction

Since the early 1990s, law firms have increasingly been able to organize themselves as Limited Liability Partnerships (LLPs) or Limited Liability Companies (LLCs). These business forms are defined principally by their limitation on an owner's personal liability for the professional misconduct of other owners. Indeed, litigation against attorneys and accountants who worked with failed depository institutions helped motivate the forms' introduction (Cicotello and Grant, 1997).

Some observers have asserted that reorganization under the new forms should be especially beneficial for small law firms, which often carry no insurance (e.g., Vock, 2003). However, others have been critical of this claim. Hillman's (2003) survey of the American legal-services industry, for example, reveals that fifty-seven percent of firms with fifty or more lawyers were organized as an LLP or LLC, versus sixteen percent of all firms. This evidence, while suggesting that the very largest firms benefit disproportionately from limited liability, is somewhat incomplete, depending on a single snapshot of the legal profession. Moreover, it is silent about the relationship between firm size and reorganization among the vast majority of firms.[1]

In this paper, we investigate the interaction between limited liability status and the organization of legal services from both a theoretical and empirical perspective. Theoretically, we explore how firms may strategically attempt to use organizational decisions and legal structure as a means for both hedging risk and extracting rents from clients. Like many papers in the field, we assume that a lawyer's effort is difficult to discern and hence reward, creating a problem of moral hazard. As a result, clients may structure contracts with attorneys to reward good outcomes and punish bad ones (a la Carr and Mathewson (1990)). In Lang and Gordon (1995) and Gaynor and Gertler (1995), a firm's size is optimal when the benefit of lower risk as profits are shared with another owner is just offset by the cost of additional

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[1] Baker and Krawiec (2006) find no relationship between firm size and the probability of reorganizing as an LLP among New York City firms with twenty-five or more lawyers.

moral hazard within the firm.[2] While our model is consistent with these approaches, it adds one twist: Anticipating their clients' behavior, attorneys may be able to manipulate a client's willingness to provide incentives by altering the size of the firm (and thus diluting individual partners' cash flow rights). Within smaller firms, these manipulations may have little effect, as a client enhances incentives through a combination of 'sticks' and 'carrots,' leaving the attorney in roughly the same position as before. However, within somewhat larger firms, we argue, cash flow dilution may skew clients towards offering enhanced 'carrots' in order sustain desired levels of effort by individual attorneys.[3]

A key role that liability limitations plays in this context is to reduce the role that 'sticks' can play in the provision of incentives, effectively shielding partners' personal assets from the partnership's claimants. Our theoretical analysis predicts that firms which could use size as a mechanism for extracting rents under the status quo ante (which we predict to be larger firms) will also be the ones most likely to agument their ability to extract rents by adopting limited liability forms. Our model also makes additional (but less definitive) predictions about post-introduction growth among firms that convert to limited liability status.

In order to test our predictions we utilize a new panel data set describing the size and business from a national dataset of American law firms during the 1990s. We find, strongly consistent with our predictions, that larger firms tend to be most likely to reorganize under limited-liability business forms subsequent to a change in legal regime. At the same time, our empirical data lend only luke-warm support to our predictions about growth among firms that convert.

The rest of this article is organized as follows. Section 2 models the organization of legal services under alternative liability regimes. Section 3

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[2] These studies offer evidence that a tradeoff between incentives and risk exists within law firms and medical practices. In a different vein, Levin and Tadelis (2005) observe that profit sharing commits a firm to delivering relatively high quality when quality is difficult for clients to observe. This theory may then explain the prevalence of partnerships (relative to corporations) in professional services (relative to other industries), if not the size of these firms.

[3] Although dissimilar in its targeted topic, Santore and Viard (2001) use a similar framework to ours in arguing that the professional prohibition on champarty is a vehicle for generating significant information rents for attorneys. In contrast to their analysis, our approach attempts to demonstrate how a firm's strategic choices about size and legal organization can also generate rents independent of the rules against champarty.

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describes business forms and liability for law firms during the 1990s, motivating our empirical approach and introducing the data set. Evidence on firm size, reorganization and growth under limited liability is presented in Section 4, followed by a conclusion.

# 2 A Model of Liability and the Organization of Legal Services

This section presents a framework to study the optimal organizational structure of professional firms. Given our data source, we will concentrate on law firms (though our analysis is general to all professional services firms and perhaps more broadly so). We endeavor to generate a model that reflects the pivotal real world relationships that we are interested in testing. Most centrally, our model must provide a mechanism for law firm size and liability shields to "matter" in some way. As noted in the introduction, there are competing arguments about whether the introduction of limited liability entities would favor small or large firms, and our model must make some predictions along this dimension. Moreover, given that the risk of liability is at the core of the attraction to limited liability, our model should allow for attorneys to be risk averse, and for them to be able to hedge liability risk by forming multi-person firms. The model should also include a rationale for why attorneys bear any risk at all, which most who study the legal profession concur to be a significant problem with agency costs at the lawyer/client level.[4]

## 2.1 Basic Framework

Consider a population of $N$ attorneys, indexed by $i \in \{1, 2, ..., N\}$, each of whom has limited wealth $w \geq 0$ available to satisfy judgment creditors. The parameter $w$ reflects 'available' wealth rather than actual wealth insofar as the choice of organizational form limits the degree to which claimants can recover against the personal assets of the attorney.

In every period, each attorney is assumed able to obtain a reservation utility of $u_0$ outside the practice of law (which we assume, for simplicity, to be

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[4]Although tax treatment of the entity is another factor that we consider important, we have excluded it here to focus on liability aspects alone. Indeed, this was probably the most important contribution of the LLC/LLP revolution for professional firms.

uniform across attorneys). If practicing law, each attorney is matched with exactly one risk-neutral client. In addition, all attorneys are assumed to have identical quasi-linear preferences in total wealth $y$, given by $U_i(y) = v(y) - \rho_i$, where $\rho_i$ (described in greater detail below) constitutes the disutility of effort by the attorney. To capture the notion of risk aversion, we suppose that $v(.)$ takes on a simple constant absolute risk aversion (CARA) form with Arrow-Pratt coefficient of $\gamma > 0$.

Attorney $i$'s effort generates (stochastic) income for the client, denoted by $Z_i$. This value of the client's income, however, turns in part on the effort the attorney expends. In particular, we suppose that:

$$Z_i = \begin{cases} 0 & \text{w/ prob. } 1 - p_{e_i} \\ \overline{Z} & \text{w/ prob. } p_{e_i} \end{cases} \tag{1}$$

where $e_i \in \{0, 1\}$ corresponds to 'low' and 'high' effort, respectively, and where $0 < p_0 < p_1 < 1$. High effort is assumed to impose a (utility-based) cost of $c$ on the attorney, while low effort imposes a smaller cost of $c - \phi$ (thus, $\phi$ represents the incremental cost savings from shirking). We suppose that each client's case is statistically independent of the others, so that for any $i$ and $j$, $E(Z_i|e_i, Z_{-i}) = E(Z_i|e_i)$.[5]

In the analysis below, we also make two regularity assumptions:

**Assumption A:** $(p_1 - p_0) > \phi \cdot \max\left\{\frac{1}{\overline{Z}}, \gamma(1 - p_1)\right\}$.

**Assumption B:** $p_1 = 1 - p_0$

Assumption A is tantamount to requiring that effort "matters" from an efficiency standpoint. In particular, high effort must be sufficiently important to justify its cost, and also that it must be large compared to the attorney's level of risk aversion (so that incentive pay does not have a counterproductive effect). While a violation of Assumption A would not undermine our general analysis, the assumption is necessary for there to be any agency cost worth solving. Assumption B requires that probability of successful outcomes conditional on working hard and shirking are symmetric about $\frac{1}{2}$. This is strictly a regularity assumption that simplifies our analysis, but our core results hold under less stringent assumptions.

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[5]In later drafts of this paper, we hope to relax this assumption, in order to consider the effects of firm scope as well as size.

At the beginning of each period, the client offers a compensation package consisting of a payment $\mu_i$ in the event that the client's case/project is successful (and pays $Z$), and an alternative payment $\beta_i$ should the case come out unsuccessful. We do not constrain the sign that either of these parameters can take. However, to the extent that either is negative, it cannot exceed (in absolute value) the attorney's available wealth; that is, $\beta_i \geq -w$. It will turn out that this nonnegativity constraint usually binds – if at all – only for $\beta_i$, for obvious incentive provision reasons. Note as well that, in the event that $\mu_i > \beta_i$, the term $(\mu_i - \beta_i)$ lends itself to an interpretation as "damages" that the client's attorney must pay if the case proves unsuccessful. We elaborate on this point at greater length below.

Under this contract, attorney $i$'s individual expected gross payoff equal to:

$$\beta_i + p_{e_i} \cdot (\mu_i - \beta_i) - c + \phi \cdot (1 - e_i), \tag{2}$$

and the variance of this gross payoff is:

$$(\mu_i - \beta_i)^2 \cdot p_{e_i} (1 - p_{e_i}) \tag{3}$$

### 2.1.1 Firms

In addition to these basic aspects of the problem, we also include the possibility that the attorney may be part of an $m-$ person firm (which we shall refer loosely to as a "partnership"[6]). Note that $m = 1$ represents the limiting case of a sole practitioner, discussed above. Each member of the firm faces a similar type of client (as reflected by an identical $Z_i$). All members/partners within a firm are assumed identical,[7] and are assumed to share equally in the gains and losses of the partnership.[8]

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[6]We place the term *partnership* in quotation markes since that term has legal significance beyond our intended use in this part of the paper. For now, we simply use the term as a generic place-holder for a multi-person firm.

[7]Although we do not explicitly assume a role for associates or staff in this paper, such a role could be easily included here. For example, if each partner faced a technological constraint imposing something akin to a Leontief production function on a client's project (i.e., the case requires one partner, one associate, two paralegals, and one secretary), then the framework we use above would readily apply, with the costs of support staff factored in as part of the cost of effort. We abstract, however, from the question of agency costs between the various players who provide litigation support, and focus solely on the agency problem between lawyers (however constituted) and clients.

[8]The alert reader will note that this assumption simplifies things somewhat. In particular, most LLC/LLP statutes do not exempt professionals from personal malpractice

A key change that multiperson firms introduces is the possibility of risk spreading. Assuming that all attorneys in the partnership put forth the same effort level $e_i$ (an assertion that we shall confirm later constitutes an equilibrium), the event of $k$ victories within the partnership is distributed binomially with parameters $(m, p_{e_i})$. (For sufficiently large values of $m$, the number of victories can be approximated with a normal distribution with mean $mp_{e_i}$ and variance $mp_{e_i}(1 - p_{e_i})$). In what follows, we utilize this normal approximation, which in conjunction with CARA utility functions, allows us to characterize preference in mean-variance space.

Assuming that all attorneys at the firm receive the same form of contract and contribute the identical amount of effort (an assertion we confirm below), the representative attorney's expected utility if she is part of an $m-$person partnership, and all attorneys exercise effort level $e$ is given by:

$$\pi\left(\beta, \mu; e, m\right) = \beta + p_e \cdot (\mu - \beta) - \gamma \cdot \frac{(\mu - \beta)^2}{m}\left(p_e\right)\left(1 - p_e\right) - c + \phi \cdot (1 - e) \quad (4)$$

Note from (4) that holding the terms of the contract and the attorney's effort choice constant, the attorney's expected utility is increasing in $m$, reflecting a principal advantage of forming multi-person firms: the ability to hedge risk. In addition to this benefit, our analysis below demonstrates that forming partnerships may also convey another advantage of *creating* a collective action problem in the firm that the client will attempt to undo by offering substantial economic rents to the attorney.

## 2.2  Strategic Sequence and Player Objectives

With this framework, we now proceed to explore how attorneys' organizational choices interact with the types of incentives offered by clients. Partnerships choose their size $m$ (and, in a later section, they simultaneously commit to their organizational structure), while clients choose the contractual terms they will offer the firm. Because size and organizational structure

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liability, though other partners/participants may be exempted (Maycheck, 1986; Hillman, 2003). In such circumstances, losses are not – at least nominally – shared equally. We justify this simplification on two grounds, however. First, a large segment of law firm liability is not malpractice based in practice (e.g., general liability when the law firm has played an active and knowing role in a client's acts of securities fraud), and thus pro-rata loss spreading is exactly accurate. Second, loss spreading – even in the malpractice context – is frequently reintroduced into the firm through indemnity agreements and frm-purchased liability insurance.

are more difficult to change in the short run, we characterize each player's maximization problem as a component of a sequential game, with the law firm choosing its organizational size first, and the client offering a contract second. Beginning with the latter, the client attempts to maximize his own expected payoff, subject to relevant constraints on the permissible contractual terms, the attorney's participation, and the attorney's private incentives to shirk. In particular, the client takes firm size $m$ as given (as well as the firm's organizational form, when applicable), and chooses contract terms $(\mu_i, \beta_i)$, and an effort level $e_i$ to solve the following program:

$$\max_{\beta_i, \mu_i, e} p_e \left( \overline{Z} - (\mu_i - \beta_i) \right) - \beta_i$$
$$s.t.$$
$$(W) \qquad \min \{\mu_i, \beta_i\} \geq -w \qquad\qquad (*)$$
$$(IR) \qquad \pi \left( \beta_i, \mu_i; e_i, m \right) \geq u_0$$
$$(IC) \quad e \in \arg \max \left\{ \pi \left( \beta_i, \mu_i; e_i, m \right) \right\}$$

The three above constraints merit some reflection, as they will reappear later in the analysis. The first constraint (denoted as *(W)*) states that while the fixed component of the attorney's compensation package can be negative (thus representing a form of liability / performance bond), it cannot exceed attorney wealth. In what follows, we shall periodically refer to condition *(W)* as the attorney's "wealth" constraint.[9] The second condition, denoted as (IR), states that the compensation package must be such the attorney is at least as well off under the contract as he would be taking his outside option that earns $u_0$. In what follows we shall periodically refer to (IR) as the "individual rationality" constraint. Condition (IC) states that the level of effort the client wishes to implement (i.e., $e = H$ or $e = L$) is the attorney's optimal strategy under his compensation package. We shall frequently refer to the (IC) constraint in what follows as the "incentive compatibility" constraint. Let the solution to program (*) be denoted as $(\mu^* (m), \beta^* (m), e^* (m))$, where we specifically note that each of these optimal choices may depend on $m$.

Anticipating the contractual terms that clients will offer, firms select their size (and later, their organizational structure) to maximize the payoff of their respective partners. Thus, the partnership chooses $m$ to solve the following

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[9]We will impose this condition even on firms with multiple partners, since every attorney's contract within that firm will (in equilibrium) places an additional liability burden on the attorney that offsets the infusion of additional resources. We return to this assumption in the extensions seciton below.

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program:

$$\max_{m} \pi\left(\mu, \beta; e, m\right)$$

s.t. $\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad$ (**)

$$\left(\mu, \beta, e\right) = \left(\mu^{*}\left(m\right), \beta^{*}\left(m\right), e^{*}\left(m\right)\right)$$

In order to characterize the equilibrium predictions of this game, we proceed backwards sequentially, beginning with the client's contract design problem.

## 2.3 Client's Contract Design Problem

It is first important to note that the client must choose between attempting to implement high effort and low effort. The optimal contract can, in theory, attempt to implement either, since for some parametric values, the client would find paying the attorney excess rents worthwhile, while for other values the client would simply allow the attorney to shirk. Thus, the first necessary task is to consider the contracts that the client would choose under the alternative assumption that she attempts to implement low versus high effort levels (respectively).

**Implementing Low Effort** Perhaps the simplest contract to analyze is the one that implements low effort. Indeed, given that the attorney benefits from a low effort level, there is no need for the client to provide incentives to induce hard work or monitoring by the attorney. This immediately gives rise to the following lemma:

**Lemma 1:** *The optimal low-effort inducing contract is a flat one consisting of $\mu = \beta = u_0 + c$. Under such a contract the attorney always expends a low effort level.*

The intuition underlying this result is very clear: All that is necessary to induce the attorney to contribute the lowest possible effort is to compensate him for his opportunity cost of time. That is exactly what the above contract does. Moreover, it is easily confirmed that so long as the costs and reservation utilities are the same for all attorneys, the contract is the same for all attorneys in the firm.

**Implementing High Effort** Let us now turn to the more interesting question of how the client can implement high effort. Unlike the case of implementing low effort, high effort requires that the principal be willing to provide

an incentive to the attorney – one that, significantly, can take the form of carrots or sticks (or a combination thereof). Analysis of this problem leads to the following Lemma (whose proof – in addition to all others – can be found in Appendix A):

**Lemma 2:** *If Assumption B holds, the optimal high-effort inducing contract consists of the following terms:*

$$\beta = \max\left\{u_0 + c + \phi - \frac{m\phi p_1}{(p_1 - p_0)} \cdot \left(1 - \gamma\phi\frac{(1 - p_1)}{(p_1 - p_0)}\right), -w\right\}$$

$$\mu = \beta + m\left(\frac{\phi}{(p_1 - p_0)}\right)$$

Note from the lemma that, consistent with standard incentive theory, $\mu > \beta$; that is, the agent receives a "bonus" (or alternatively, avoids receiving a "penalty") when the case is successful. The difference between $\mu$ and $\beta$, moreover, is strictly increasing in $m$ and $\phi$. This result is intuitive. First, as the size of the partnership (reflected by $m$) grows, free riding problems get larger since each attorney's income turns less and less on his own case and more on that of other partners. To counter this fact, the client has to offer more in incentives to the attorney. In addition, as the incremental cost of effort (reflected by $\phi$) grows larger, the client must provide more incentives to do much of the disciplining work. On the other hand, incentives become lower powered when $(p_1 - p_0)$ shrinks, since ex post outcomes are a more reliable method for verifying ex ante effort.

Note also that the fixed component $\beta$ is initially decreasing in $m$, but it eventually flattens completely at the point where $\beta = -w$. The intuition here is simple: if the attorney's available wealth is sufficiently large relative to the size of the firm, then she can credibly commit to a contract that forces significant damages from her should the case be resolved negatively, and her wealth constraint never binds. On the other hand, if the attorney is extremely wealth constrained (relative to the size of the firm), then she cannot afford to commit to a penalty that offsets (in expectation) the size of her bonus. Here, the $(IR)$ constraint no longer binds, and instead the $(W)$ constraint becomes binding. Consequently, when this occurs, in order to induce high effort, the client must offer the attorney a contract laden with more 'carrots' than 'sticks'. In turn, then, there turns out to be a natural size threshold for the firm, beyond which attorneys' wealth constraints become binding. This size threshold is given by Lemma 3:

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**Lemma 3:** *Constraint (W) rather than constraint (IR) binds if and only if:*

$$m \geq \widetilde{m} \equiv \frac{(p_1 - p_0)}{\phi p_1} \cdot \frac{u_0 + c + \phi + w}{\left(1 - \gamma \phi \frac{(1-p_1)}{(p_1 - p_0)}\right)} \tag{5}$$

*Moreover, if Assumption B holds, $\widetilde{m}$ is strictly positive.*

## 2.4   Optimal Contract

While the discussion above characterizes the type of contract the representative client will offer for each level of effort she might attempt to implement, we have not yet considered which level of effort is optimal from the client's perspective. Analysis of the above constraints, however, immediately yields this insight, which is reflected in Proposition 1 and associated Corollaries:

**Proposition 1:** *If Assumptions A and B hold, the client will choose to implement high effort if and only the size of the firm satisfies $m \leq \hat{m}$, where*

$$\hat{m} = \begin{cases} m^* \equiv (p_1 - p_0) \frac{(p_1 - p_0)\overline{Z} + (u_0 + c + w)}{\phi p_1} & \text{if } m \geq \widetilde{m} \\ m^{**} \equiv (p_1 - p_0)^2 \frac{(p_1 - p_0)\overline{Z} - \phi}{\gamma \phi^2 p_1 (1 - p_1)} & \text{if } m < \widetilde{m} \end{cases} \tag{6}$$

Direct application of Proposition 1 immediately yields the following corollaries:

**Corollary 1A:** *If Assumptions A and B hold, then $m^* > m^{**}$.*

**Corollary 1B:** *If Assumptions A and B hold, then attorneys will earn positive economic rents if and only if $w \leq w^*$, where:*

$$w^* \equiv \left(\frac{(p_1 - p_0)}{\gamma \phi (1 - p_1)} - 1\right)(p_1 - p_0) \cdot \overline{Z} - \frac{(p_1 - p_0)}{\gamma (1 - p_1)} - (u_0 + c) \tag{7}$$

**Corollary 1C:** *If Assumptions A and B hold, then attorneys will earn positive economic rents if and only if $\overline{Z} \geq \overline{Z}^*$, where:*

$$\overline{Z}^* \equiv \left(\frac{(u_0 + c + w)(1 - (p_1 - p_0) + \gamma \phi (1 - p_1)) + \phi}{((p_1 - p_0) - \gamma \phi (1 - p_1))}\right) \tag{8}$$

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Proposition 1 and Corollaries 1A-1C offer observations about the contract that the client will find it optimal to offer – observations that are important for considering the firm's optimal choice of size. First, the proposition shows that regardless of whether the wealth constraint or the participation constraint binds, there exists a critical firm size above which the client is unwilling to implement high effort. Instead, for firms that exceed this critical size, the client will pay for, expect, and receive a low level of effort by the attorney.

Interestingly, the critical cutoffs at which the client implements low effort depend (in part) on whether $(W)$ or $(IR)$ is binding. Corollary 1A states that the high effort contract cutoff when the rationality constraint binds $(m^{**})$ is below the size that will support high effort when the wealth constraint binds $(m^*)$; this is important since it suggests that at times where the wealth constraint begins to bind, there may be a discontinuous shift upwards in firm size. Corollaries 1B and 1C state that if the firm is ever in a situation where wealth constraints bind, it is when available attorney wealth is relatively low or (equivalently) when client stakes are relatively large.

## 2.5 Firm's Organizational Design Decision

We now proceed backward, asking what size the firm will create for itself in light of the contract terms it expects its attorneys to receive from clients (which take firm size into account). Although a direct application of Proposition 1 implies the optimal size choice of a firm in the event that the attorneys' wealth constraints are binding, when the IR constraint is binding the attorneys are indifferent about size. Indeed, here, the client always sets contractual terms so that the representative attorney's expected compensation is precisely equal to his reservation utility. Nevertheless, while the attorney is therefore indifferent between implementing a high-effort and low-effort contract, the client strictly prefers a high-effort contract, since the client reaps the gains from that contract. Thus, in order to generate a more precise prediction about firm size when the wealth constraint is not binding, we need to incorporate an additional assumption. The weakest assumption consistent with this intuition is as follows:

**Assumption C:** *If the attorneys are indifferent, they choose the largest organizational size that efficiently supports high effort ($e = 1$) rather than one supporting low effort ($e = 0$).*

Assumption C states that at least when attorneys are indifferent in equilibrium, they will choose an organizational choice that will support an efficient effort level, and thus the attorney always receives a contract that has both fixed and contingent components. This seems a sensible choice, since the parties would be throwing money away if the attorney chose a structure that induced inefficient low effort. Realizing this, prospective clients would be willing to make at least modest payments to firms that organize themselves in a way that encourages efficient legal representation. Moreover, choosing the largest firm consistent with such incentives allows maximal spreading of risk.

With this assumption in hand, we can now proceed to state the following Proposition:

**Proposition 2:** *Suppose that Assumptions A, B, and C hold. If $\overline{Z} \geq \overline{Z}^*$, the firm selects a size of $m = m^*$. Otherwise, the firm selects a size of $m = m^{**} < m^*$.*

Proposition 2 states that the firm's optimal choice of size turns crucially whether the stakes of the average case in the firm are sufficiently large that attorneys in that firm are likely to face binding wealth constraints. If so, then the firm will exploit the rents that attorneys derive from such a constraint, setting equal to $m^*$. Conversely if the firm's cases fall short of the threshold where the wealth constraint binds, then it will choose a more modest size of $m^{**}$.
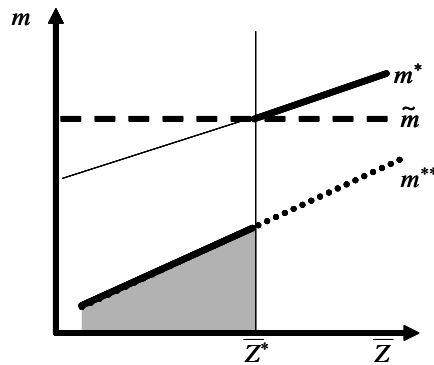


Figure 1

Figure 1 attempts to illustrate this intuition. In the figure, average stakes per client are depicted on the horizontal axis and the firm's size is depicted

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on the vertical axis. The threshold cutoff is denoted as $\overline{Z}^*$ in the Figure, and the actual size configuration of the firm is tracked by the solid bold line. Note that when $\overline{Z} < \overline{Z}^*$, the firm's optimal size tracks the $m^{**}$ schedule. However once $\overline{Z}$ reaches $\overline{Z}^*$, the firm immediately jumps in size to $\widetilde{m}$, and grows along the $m^*$ schedule thereafter. From this figure, we can discern a sort of "tipping point" phenomenon: should the type of cases reach a threshold value of $\overline{Z}^*$, it will experience rapid growth as it settles on a new trajectory. This will prove to be an important observation as we turn our attention to the firm's organizational choice when a limited liability structure is made available. (A similar graphical analysis to that above applies to the firm size choice as $w$ varies).

## 2.6   Allowing Alternative Business Forms

We now turn to the central question that motivated this paper: How are firm characteristics (particularly organizational structure and size) likely to change when a limited liability business form (such as with an LLC or LLP) becomes available? Although modeling the precise contours of a limited liability statute would probably require tailoring for each state's specific statute, there is one feature that they all essentially share: the introduction of LLP/LLC status has the effect of reducing the amount of the attorneys' personal assets that are available to creditors. In essence, then, if a firm were to adopt a limited liability regime, it would effectively reduce the amount of available wealth per attorney $w$ under an optimal incentive contract.[10]  In mathematical terms, then, introduction of limited liability represents a shock to the wealth constraint, reducing available wealth in adopting firms to some $w' < w$. The key questions for us here, then, are: (a) What sorts of firms would opt to constrain themselves in this way? and (b) How will a firm's size change after it adopts (or fails to adopt) limited liability status?

   To answer these questions, we consider two types of firms. First, consider a firm that was already earning positive rents under the status quo ante (which recall was possible only for firms for which the wealth constraint was binding – i.e., whose size exceeded $\tilde{m}$. Recall that such a firm tended to have large-stakes clients (i.e., large $\overline{Z}$)and was therefore relatively large under the

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[10]We realize that this is perhaps a generalization, and there may be more subtle nuances that the imposition of limited liability may have. However, the comparative statics derived below capture the general flavor of what such statutory innovation brings without significant technical details that are likley to distract the analysis more than change it.

status quo. The representative attorney's indirect payoff in such a firm is as follows:

$$\pi\left(w, m^{*}; e_{H}=1\right) = -\left(w+c+\phi\right)+p_{1} \cdot m\left(\frac{\phi}{\left(p_{1}-p_{0}\right)}\right)\left(1-\frac{\gamma\phi\left(1-p_{1}\right)}{\left(p_{1}-p_{0}\right)}\right) \tag{9}$$

At the optimal contract terms, the representative attorney's expected utility exhibits the following comparative static on $w$:

$$\begin{aligned}
\frac{d\pi}{dw} &= -1+p_{1}\left(\frac{\phi}{\left(p_{1}-p_{0}\right)}\right)\left(1-\frac{\gamma\phi\left(1-p_{1}\right)}{\left(p_{1}-p_{0}\right)}\right)\cdot\frac{\partial m^{*}}{\partial w} \\
&= -\frac{\gamma\phi\left(1-p_{1}\right)}{\left(p_{1}-p_{0}\right)} < 0
\end{aligned} \tag{10}$$

Thus, for firms sufficiently "large" to have been facing a binding wealth constraint under the status quo ante, the availability of the LLC/LLP status would cause them to become more profitable unambiguously, and therefore they would be likely to take up the new status.

But in addition to firms that begin large, the introduction of a limited liability business form makes it potentially attractive for somewhat more modestly sized firms to choose to convert. For these firms – whose size was less than $\tilde{m}$ – the wealth constraint was not binding (but rather, the participation constraint was). Now, a significant shift from $w$ to $w'$ effectively tightens the wealth constraint, so much so that many moderately sized firms may find that they now have an opportunity to generate positive rents by converting. Such firms, consequently, will also find it profitable to convert.

Taken together, these insights generate the following proposition:

**Proposition 3:** *Suppose that Assumptions A, B & C hold. All firms that have clients with stakes larger than $\overline{Z}'$ will find it profitable to adopt the limited liability form, where:*

$$\overline{Z}' = \frac{\left(u_{0}+c+w'\right)\left(1-\left(p_{1}-p_{0}\right)+\gamma\phi\left(1-p_{1}\right)\right)+\phi}{\left(\left(p_{1}-p_{0}\right)-\gamma\phi\left(1-p_{1}\right)\right)} < \overline{Z}^{*}$$

*Firms on the interval $\overline{Z} \in \left[0, \overline{Z}'\right]$, in contrast, will not convert.*

In addition to making predictions about conversion, our analysis also facilitates a prediction about the growth rates of firms based on their take-up decisions. These predictions are embodied in Proposition 4:

**Proposition 4:** *Suppose that Assumptions A, B & C hold. All converting firms facing clients in the range $\left[\overline{Z}', \overline{Z}^*\right]$ will experience significant, positive growth after converting. All firms facing clients in the range $\left[\overline{Z}^*, \infty\right]$ will experience marginal contraction after converting. Finally, all firms facing clients in the range $\left[0, \overline{Z}'\right]$ will not convert, and consequently will not grow or shrink as a result of their business form.*
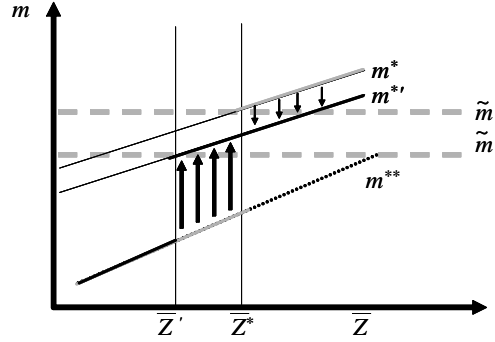


Figure 2

Figure 2 helps illustrate the key intuitions of Propositions 3 and 4. In the figure, the horizontal axis once again represents the stakes represented by the representative client of the firm, while the vertical axis represents the size of the firm. Initially, we suppose that available per-attorney wealth is given by $w$, and accordingly the threshold stakes level at which a firm can begin to generate rents is at $\overline{Z}^*$ (which corresponds to the lowest point at which $m^*$ exceeds $\tilde{m}$. All firms with client stakes *above* the threshold value $\overline{Z}^*$ will select a size corresponding to the $m^*$ schedule. In contrast, all firms below the threshold value $\overline{Z}^*$ will select a size corresponding to the $m^{**}$ schedule.

Now consider the effect of introducing an option to adopt limited liability status, effectively sharpening the wealth constraint to some $w' < w$. As the figure illustrates, and as implied by (5) and (6), the reduction to $w'$ causes the $m^*$ curve and the $\tilde{m}$ curve to shift downwards (depicted by the shifted schedules $m^{*\prime}$ and $\tilde{m}'$, respectively), though it does not affect the $m^{**}$ schedule.[11] As a result of these shifts, the value of the critical $\overline{Z}^*$ declines to $\overline{Z}'$.

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[11]Note also that the $m^*$ curve shifts by a smaller amount than does the $\tilde{m}$ curve, which is an immediate result of differentiating both values with respect to $w$.

Accordingly, all firms that began in the range of $\left[\overline{Z}', \overline{Z}^*\right]$ will convert and jump in size from the $m^{**}$ schedule to the $m_2^*$ schedule. Conversely, all firms that began with client types in excess of $\overline{Z}^*$ also convert, but shrink marginally after converting. In what follows, we will define these two groups of firms as the "marginal" and "extra-marginal" converters, respectively. Finally, those firms with client types below $\overline{Z}'$ never convert and do not change in size.

## 2.7 Testable Implications

We now turn to some testable implications of our model. Before doing so, we should note that our data do not allow us to calibrate, on *a priori* grounds, the precise values of the deep parameters for firms within in our model. In particular, we cannot say very much about whether the range of client stakes (represented by $\overline{Z}$) is relatively high or low relative to other parameters in the model. This limitation, in turn, constrains some of our predictive power. It may be, for example, that the population client types is so low on this scale that no firms actually convert. Or, it may be that client types are so large that *all* firms convert. Nevertheless, Propositions 3 and 4 still motivate at least some empirical predictions about the nature of take-up rates and size adjustments after takeup.

First, we would predict that if there is some heterogeneity in takeup decisions (with some firms adopting new forms while other firms not adopting), takeup rates would be disproportionately larger for firms on the 'right tail' of the ex ante size distribution. That is, our model would predict that moderately large to large practices are most likely to take up new business forms, given that it is these firms can most effectively use the liability shield to garner larger rents from clients. Small firms, in contrast (with smaller stakes clients), are in a poorer position to realize the benefits of the limited liability form, since clients can retain their expected revenues by ratcheting back the fixed component of compensation. This reasoning thereby generates our first prediction:

**Prediction 1:** *If firms' conversion decisions are heterogeneous, then larger firms are systematically more likely than smaller firms to take up new limited liability business forms (assuming that the costs of doing so do not increase too rapidly with size).*

Propositions 3 and 4 facilitate a second form of prediction concerning growth following a conversion. Among "marginal" converters (those with client types between $\bar{Z}'$ and $\bar{Z}^*$), it is clear that they experience significant growth, with the change in the number of owners declining in initial firm size. Among the "extra-marginal" converters (those with client types in excess of $\bar{Z}^*$), our model predicts modest contraction. This non-monotonicity in post-conversion growth creates some limitations on what sorts of predictions we can generate (particularly without being able to formulate an a priori distribution of client types over $\bar{Z}$). Nevertheless, it is still possible to make at least the following sort of prediction:

**Prediction 2:** *If firms' conversion decisions are heterogeneous, then among converters, growth will be greatest for marginal converters (i.e., the smallest firms that convert). Moreover, post-conversion growth will tend to decline (at least initially) as the ex ante size of the firm increases.*

The parenthetical caveat in Prediction 2 is due to the fact that we cannot be sure whether our sample also includes "extra-marginal" converters[12], whose clients have sufficiently large stakes that they would experience a slight contraction in size. If such firms are represented in our data, then at the upper quantiles of converters we would expect modest contraction.

## 2.8 Caveats and Extensions

Before moving on to the empirical portion of the paper, it is worth noting a number of caveats to our framework, and possible extensions that one might consider to the framework.

### 2.8.1 Internal Monitoring

First, our analysis has not delved deeply into internal monitoring structures at the firm. This may be a significant factor in the limited liability debate, given that the exposure of other members of the firm to the liability of

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[12]In contrast, we can be relatively confident that if firms' conversion decisions are heterogeneous, then our data likely include *marginal* converting firms. Indeed, within this population are the firms that (by definition) are right on the extensive margin of converting versus not converting.

others may induce them to take actions to reduce agency costs within the firm. Reducing liability exposure, then, would weaken those incentives. It is relatively straightforward to add monitoring technology to our model. For example, following Talley & Johnsen (2004), one might suppose after clients offer contracts to the firm, the firm allocates $x$ dollars' worth of resources (per partner) at reducing agency costs. In particular, this expenditure might reduce the value of shirking $(\phi)$ for each partner to a smaller value of $\phi(x)$, where $\phi(0) = \phi$, $\phi'(x) < 0$, and $\phi''(x) > 0$. The incentive to expend these resources would, in equilibrium, turn on exposure to downside liability.

Introducing this sort of monitoring technology would have a few important effects on our analysis. First, it would make clients more willing, ceteris paribus, to offer incentive contracts to attorneys (such that $\mu > \beta$). Indeed, the client could free ride on the firm's incentive to reduce the benefits from shirking through internal monitoring, which would slacken the incentive constraint for each contract. In turn, such monitoring would increase the critical threshold size levels ($m^{**}$ and $m^*$) that a firm might reach while still retaining incentive contracts. On the other hand, firms may no longer wish to grow that large, since growth also increases the aggregate costs they can expect to bear on monitoring. Thus, while introducing monitoring might cause firms to grow some, the effect might be limited. As to conversion decisions, the introduction of monitoring technology would have little effect on our predictions: that is, converters would still be disproportionately represented by larger firms. Post-conversion growth, in contrast, would be ambiguously affected by monitoring. On the one hand, conversion would reduce the incentive to monitor, which would cause critical firm levels ($m^{**}$ and $m^*$) to decrease significantly after converting, thereby suggesting a contractionary effect of conversion for all firms who choose that option. On the other hand, facing smaller stakes for failed monitoring, firms may be willing to grow in size, and this effect may have first order significance. Thus, the introduction of internal monitoring would not change our first prediction (about takeup), but would have the effect of clouding our second set of predictions (about post-takeup growth).

### 2.8.2 Slackening the Wealth Constraint

Another extension to the model would involve exploring more deeply how, in multi-person firms, the wealth constraint $(W)$ might slacken. Recall that in the foregoing analysis we imposed the condition $\beta_i \geq -w$, regardless of

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the size of the firm. However, when $m \geq 2$ this condition may be overly restrictive, since the client may be able to extract a larger sanction against the firm by virtue of the fact that it lays claim to a larger pool of potential resources, including other attorneys' wealth and winning clients' fees.

One could generalize our analysis to formulate a state-contingent wealth constraint across clients at a firm. In particular, in an $m-$member firm, let $A_0$ denote $\{j|Z_i = 0\}$, representing the set of clients who have had unsuccessful outcomes; similarly, let $A_{\bar{Z}}$ denote $\{j|Z_i = \bar{Z}\}$, representing the set of clients who observe successful outcomes. A firm-level wealth constraint for any partition $\{A_0|A_{\bar{Z}}\}$ would be given by:

$$\sum_{j \in A_0} \beta_j + m \cdot w + \sum_{i \in A_{\bar{Z}}} \mu_i \geq 0 \tag{11}$$

If all other clients in a firm were to offer identical contracts to their respective attorneys of $(\mu, \beta)$, and if we denote $k$ to be the cardinality of $A_0$, then the wealth constraint faced by client $i$ (assuming $k$ unsuccessful outcomes) would reduce to:

$$\beta_{ik} \geq \mu - \frac{m \cdot (w + \mu)}{k} \tag{12}$$

Consequently, with an $m-$person firm, a client $i$ could offer a menu of state-contingent contracts consisting of $\{\mu_{i,}\beta_{i1}, \beta_{i2}, ..., \beta_{im}\}$, where $\beta_{ik}$ represents a distinct state-contingent payoff for the firm corresponding to each $k$ (and subject to a distinct wealth constraint). Note that the right hand side of this constraint is strictly decreasing in $w$ as before, and that it is also decreasing $m$, signifying additional slackness in the wealth constraint for larger firms. Also note that the weath constraint also slackens as $\mu$ increases, since enhanced client incentives provide greater revenues from which other clients might draw.

Although we will not attempt to derive them all here, allowing for large-firm slack wealth constraint does not generally alter our qualitative conclusions, but it has a few important implications for our analysis. First, and most immediately, it significantly increases the number of wealth constraints that we must analyze, from 1 to $m$. This complication is not as daunting as it first appears, however.[13] A second implication is that the slack firm-level wealth constraint represents a stronger disincentive to grow, and in fact

[13]In particular, it turns out that one can constrain analysis to the two polar cases where either (a) none of the wealth constraints is binding; or (b) all of them are. All other

enables a firm to 'outgrow' its own wealth constraint. The resulting effect will be to truncate the optimal firm size far below that which prevailed in the prior formulation (both in the absence and presence of limited liability status). Finally, the multiple state contingencies required to analyze this case makes it more technically challenging to characterize a solution.[14]

### 2.8.3  Judicial Accuracy

Our analysis has also assumed that courts could enforce fully clients' incentive contracts with attorneys, without making mistakes as to the realized state of the world. It would be possible to relax this assumption as well, in a few directions. Most directly, courts may misidentify the realization of $Z_i$ with some probability. For example, when $Z_i = \bar{Z}$, a court might err with probability $\tau_{\bar{Z}} < \frac{1}{2}$ that the opposite state, $Z_i = 0$ has obtained (a 'false negative'). Alternatively when $Z_i = 0$, a court might err with probability $\tau_0 < \frac{1}{2}$ that the opposite state, $Z_i = \bar{Z}$, has obtained (a 'false positive').

Introducing judicial inaccuracy of the sort described above would affect our analysis by diluting the incentives that clients offer their attorneys. Indeed, an attorney who expended high (low) effort under this permutation would expect to receive $\mu$ with lower (greater) probability than he would have expected otherwise.[15] Knowing this, a client hoping to induce high effort would have to offer a higher-powered incentive contract (that is, a larger $(\mu_i - \beta_i)$). This would have the effect of reducing $\tilde{m}$ and $\hat{m}$, but the qualitative predictions of the paper would remain the same.

### 2.8.4  Competition

Another important extension worth considering in our model is the effect of competition on firm size decisions. To be sure, part of our analysis reflects some aspects of competition _ e.g., clients are assumed to make a take it or leave it contract offer to attorneys. Given an installed firm size, then,

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permutations from a distributional and efficiency perspective can be replicated by one of these two.

[14]For example, under the formulation described here, it is no longer appropriate to approximate the attorneys' pro-rata payoffs with a normal distribution, which in turn makes it more difficult to analyze within the family of CARA utility functions.

[15]In particular, a high-effort attorney would expect to receive an incentive bonus with probability $p_1 (1 - \tau_{\bar{Z}}) + (1 - p_1) \tau_0 < p_1$; a low-effort attorney would expect to receive an incntive bonus with probability $(p_0 (1 - \tau_{\bar{Z}}) + (1 - p_0) \tau_0 > p_0$.

our model likely reflects a form of price competition among firms. At the same time, however, firms in our model do not compete on other dimensions, such as size. Rather, they are assumed to select their size strategically, to affect the terms of their eventual contract offer from the client. It would be possible to relax this assumption, positing instead that firms compete along size and price dimensions with one another. The result of introducing such competition in our model, as one might expect, would be to cause firms to shrink in size, never growing to the point where the attorneys' wealth constraint becomes binding (and attorneys begin to capture equilibrium rents). The introduction of limited liability business forms in such a model, then, would likely be of little moment – at least within our framework. Indeed, if attorneys earned no rents under the status quo ante, and could be assured of competing away any rents they did earn after converting, there would be very little affirmative reason to convert. But if, for some reason, some firms were to convert, their post conversion competition would cause them to contract in value, below the point where they can use their size to earn positive rents. Thus, although we do not formally model size competition in our framework, its effect would produce predictions that are clearly at odds with ours. If we were to find few conversions, with little pattern to them, followed by significant contraction, then such findings would likely represent evidence against our specification and in favor of a size competition model.

## 3 Business Forms and Liability for Law Firms in the 1990s

The owners of law firms could organize their businesses under a growing variety of forms during the 1990s. Liability exposure and other factors differentiate these forms in owners' eyes (Ciccotello and Grant, 1997; Hillman, 2003). Hillman (2003) surveys the business forms available to law firms across states and identifies major forms, which we use in our analysis. This section describes these forms and relates them to our theory.

From an owner's perspective, a general partnership (abbreviated GP hereafter) has attractive as well as unattractive features. Profits are taxed only once, at the personal level, in contrast with the earnings of a corporation. Yet partners are jointly liable for any obligation incurred by a partner on the firm's behalf, as well as jointly and severally liable for wrongful acts commit-

ted by a partner.[16]  This professional liability flows from an attorney's duty to her clients, a duty intended to protect consumers of these highly specialized services (Hillman, 2003).  This policy objective helps to account for the historical fact that the GP had long been the only business form generally available to a multi-owner firm.

Law firms were first permitted to organize as professional corporations (PCs hereafter) in the 1960s.  The owners of a PC enjoyed tax benefits relating to pensions and profit sharing that had largely been restricted to corporations (Gilson, 1991).  Earnings could be passed-through for tax purposes under subchapter S status.  However, these tax benefits were diminished by changes to the Internal Revenue Code in the 1980s, and election of Subchapter S imposes significant restrictions on firm structure.[17]  A PC's liability shield can be attractive (Carr and Mathewson, 1991).  In many states the owners of a PC are not personally liable for a firm's ordinary obligations (such as debts).  Liability for professional misconduct frequently remains unlimited, however (Maycheck, 1986; Hillman, 2003).

In the 1990s still more forms became available to law firms.  The Limited Liability Partnership and Limited Liability Company (LLP and LLC, respectively) combine the appealing elements of the partnership with those of the corporation.  Under these forms, earnings are passed to owners without encumbering the firm.  In most states owners are shielded from personal liability for the firm's ordinary obligations.

Without exception, an owner of an LLP or LLC is not liable for the professional misconduct of other owners.[18]  This characteristic is definitive. While an "innocent" owner is typically held liable only if the assets of the firm and the bad actor (including any liability insurance) are exhausted, such liability has been a significant concern (Reuben, 1994).  Indeed, some states appear to have introduced these forms in response to the efforts of federal regulators to call on the personal wealth of professionals who served failed depository institutions (Ciccotello and Grant, 1997).[19]

These new forms are playing an increasingly significant role in the Amer-

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[16]See, for example, the Uniform Partnership Act §§ 13-15 (1914).

[17]For example, the number of shareholders cannot exceed 75 shareholders, and the S Corporation's single class of stock restricts the allocation of control.

[18]An attorney's personal liability for her own professional misconduct and those she supervises persists under all of these business forms.

[19]Texas created the LLP for professionals in 1991.  The LLC was first introduced in Wyoming in 1977 to serve small business in general (Ciccotello and Grant, 1997).

ican legal-services industry. Table 1 shows the share of American law firms organized under the major forms in recent years. The combined share of LLPs and LLCs grew from 0.5% in 1993 to 10.9% in 1999. By 2003, 16.3% of American law firms were LLPs or LLCs. PCs are also playing a larger role, with their share increasing from 33% in 1993 to 48% in 2003. Table 1 includes sole proprietorships (SPs); these single-owner firms are similar to GPs, with the important distinction that co-owners are no longer a source of liability exposure.

The Martindale Hubbell Law Directory, the leading directory of law firms and lawyers in the U.S., is the source of these statistics. We were able to construct a data set based on the Directory that tracks the size and business form of American law firms between the years 1993 and 1999; this complex undertaking is described in Appendix B. These two years largely bookend the introduction of the LLP and LLC forms. Appendix C reports that fifteen states permitted law firms to organize under one of the new forms in 1993; only Kentucky and Nebraska had yet to do so as of 1999.[20]

GPs in 1993 are the unlimited-liability firms of our theory. The LLP and LLC forms presented an opportunity to shield each of a GP's owners from personal liability, particularly for the professional misconduct of other owners, without significanly altering the firm's tax treatment or flexibility. Indeed, Table 2 reports that 88.6% of those LLPs in 1999 that appeared in our sample in 1993 had been GPs; the figure is 83.3% for LLCs.[21] While the owners of PCs also faced liability for others' professional misconduct in some states, reorganization by PCs can be a taxable event (Donn, 2004).

The status of GPs as of 1999 appears in Table 3. 5.2% of all GPs in 1993 (including the nearly half that did not appear in our 1999 sample) reorganized as LLPs; 1.3% reorganized as LLCs. While the LLC form always shields owners from liability for ordinary obligations, the LLP form applies only to liability arising from other owners' professional misconduct in twelve states (Donn, 2004). Nevertheless, the owners of GPs apparently prefer the title of "Partner" to that of "Shareholder" (Hillman, 2003). GPs were one third as likely to reorganize as a PC as under the new forms.

The specifics of these forms, and hence their relative costs and benefits,

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[20]We define the year of introduction as the first September in which a form was available. Our data set is derived from Fall editions of the Directory.

[21]30.2% of LLPs in 1993 appeared in our 1993 sample; 26.8% of these had been GPs; hence, 88.6% of LLPs that operated in 1993 had been GPs. The LLC statistic was similarly derived.

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vary across states. PCs may have been a close substitute for the new forms in some instances. In other cases, GPs may have converted to PCs before the new forms became available. This explanation is consistent with an inverse relationship between the rate of reorganization under the new forms and their year of introduction, as is apparent in Figure 9. This pattern is also consistent with early introduction in states in which the net benefits of the LLP and LLC forms were greatest.

**INSERT FIGURE 3 HERE**

Almost half of GPs in 1993 did not appear in the 1999 sample. A crude estimate is that almost forty percent of law firms would not have survived from 1993 to 1999.[22] Discrepancies between the 1993 and 1999 versions of the Directory may account for the remaining "deaths." Our algorithm for linking firms in 1993 and 1999 matched (in part) on surnames within firm names. We have no reason to believe such attrition is non-random and hence problematic. Mergers or spinoffs in which firms' names changed may also contribute to the remaining "deaths"; such events are beyond the scope of the present analysis.

# 4    Testing the Theory

As the preceding section explained, the GP is the law firm of our theory. We therefore investigate size, reorganization and growth among GPs in 1993 that appear in our 1999 sample. GPs whose main offices were located in Kentucky or Nebraska are excluded, as these states had not introduced either the LLP or LLC form by 1999.

**INSERT TABLE 4 HERE**

Summary statistics for the sample appear in Table 4. The number of owners among these GPs averaged 5.70 in 1993, with a standard deviation of 15.68. The number of owners is the relevant measure of firm size under the

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[22]8.0% of law offices (as distinct from firms) "died" in 1995 (U.S. Census Bureau, 2006). Applying this rate to the period 1993-1999 implies that almost forty percent of offices would have died. The rate for offices may be a reasonable approximation of the rate for firms, as eighty-nine percent of firms in our 1993 sample had only one office; the rate for firms may itself be a reasonable approximation of the rate for GPs.

theory. A firm must choose its number of owners; furthermore, the number of owners is tied to clients' heterogeneous stakes in successful outcomes.[23] We ensure that the treatment of size in the empirical analyses is flexible by classifying firms into six "size classes," namely, 2 owners, 3-4 owners, 5-8 owners, 9-15 owners, 16-76 owners, and 77+ owners. As Table 4 indicates, these classes divide the size distribution roughly at its 50th, 75th, 90th, 95th and 99th percentiles. The data set also includes the number of states in which each GP operated offices in 1993. As we discuss below, this number may be relevant to firm behavior.

## 4.1 Size and Reorganization among GPs

The theory predicts that limited liability increases the earnings of firms whose size exceeds some threshold. To test this prediction, we infer the benefit of limited liability to GPs of different sizes from their observed choices as of 1999 and a behavioral model of choice of business form. Owners are assumed to choose the form that maximizes their utility, which is defined as follows:

$$u_{ij} = \Pi_j \left( \mathbf{X}_i \right) + v_{ij} \tag{13}$$

$\Pi_j \left( \mathbf{X}_i \right)$ includes determinants of firm $i$'s profits under form $j$ that we observe as researchers and $v_{ij}$ includes any determinants observed only by the firm. Profits account for all of the benefits and costs of operating under a form, including any costs of reorganizing. These latter costs may be significant; Table 4 indicates that only 17.6% of GPs found it most profitable to reorganize.

Nevertheless, the relationship between profits and choice of form, on the one hand, and firm size, on the other, can falsify the theory. A comparison of profits as a GP to profits as an LLP or LLC reveals the benefit of limited liability. As we observed in Section 3, limited liability for other owners' professional misconduct distinguishes the LLP and LLC forms from a GP. Furthermore, reorganization costs are unlikely to lead to a failure to reject the theory's null hypothesis. The regulatory cost of registering as an LLP or LLC is generally modest and sometimes increases with the number of owners (Bromberg and Ribstein, 2003). The revisitation of settled issues (such as the division of earnings) can be a substantial "cost" of reorganization (Baker

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[23]We are not aware of any comprehensive data pertinent to the stakes of law firms' clients.

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and Krawiec, 2005). It seems plausible that the level of such transaction costs would increase with firm size, much as size may exacerbate the problem of moral hazard within the firm.

Table 5 describes the relationship observed in the data between firm size and choice of form. Only 3.7 percent of the smallest GPs—those with 2 owners—reorganized under the LLP or LLC forms. The observed probability of reorganization increased markedly and steadily with firm size. Among GPs with 3-4 owners, 11.0% became either an LLP or an LLC. This probability reached a maximum of 61.3% among GPs with 16-76 owners and then decreased to 51.7% among the largest GPs—those with 77+ owners. This decline was largely due to a decline in the probability of reorganization as an LLC from 9.7% to 1.7%.

## INSERT TABLE 5 HERE

While our focus is on the LLP and LLC forms, reorganization as a PC is also of interest. As we discussed in Section 3, the PC form's liability shield may be relatively attractive in some states. Table 5 indicates that the probability of reorganization as a PC varied only modestly with firm size. In particular, the largest GPs opted for the PC form less often than smaller firms did. Hence, the observed probability of reorganization under the LLP, LLC or PC form increased with size through the ninety-ninth percentile of the size distribution, while GPs with 16-76 owners were more likely to reorganize than those with 77+ owners.

These observed relationships, however, may confound the size-specific benefit of limited liability with other factors. For example, if a large firm operated in several states, late introduction of the LLP or LLC form in some states relative to others could make reorganization less attractive. Illinois in particular was a late adopter of the LLP form, and national firms operating there could reorganize as an LLP as of 1999 only by spinning off the Illinois operation as a separate entity (Hillman, 2003).

We therefore use multivariate models of multinomial choice to analyze GPs' behavior. The firms in our analytical sample could choose among the following options: reorganize as an LLP, LLC or PC, or remain a GP/SP. The negligible proportion of GPs that became SPs are "lumped" with those that remained GPs, as the former firms merely shrank in size, rather than changing their legal form of organizaton.

Firm $i$'s profits under outcome $j$ are specified as follows[24]:

$$\Pi_j (\mathbf{X}_i) = \mathbf{X}_i \boldsymbol{\beta}_j$$

$\mathbf{X}_i$ includes size dummy variables that equaled one if a firm's size in 1993 fell within the relevant size class. We also include a set of state dummy variables that equals one if a firm was based in the relevant state.[25] These covariates account for heterogeneity in the characteristics of the various forms, and thus variation in their relative attractiveness, across states.[26] A constant term for each form corresponds to 2-owner GPs based in Alaska.[27] Finally, we include the number of states in which a firm operated in 1993. This covariate is intended to reflect the impact, if any, of multi-state operation on the net profitability of changing form. Operating in multiple states may also proxy for unobserved firm attributes, such as managerial quality.

The unobserved utility is specified as in Cardell (1997):

$$\nu_{ij} = \sum_g \left[ d_{jg} \zeta_{ig} \right] + (1 - \sigma) \, \epsilon_{ij}, \qquad (14)$$

$\epsilon_{ij}$ is assumed to be i.i.d. type-I extreme value. $d_{jg}$ is a dummy variable that equals one for outcomes that belong to the same group or "nest," as identified by the researcher; $\zeta_{ig}$ are random coefficients on group membership whose distribution depends on the parameter $\sigma$, which decomposes the variance of the unoobservable into intra-group and cross-group components. As $\sigma$ approaches zero, the random coefficients $\zeta_{ig}$ become degenerate, and the model reduces to the multinomial logit. Otherwise, the model is equivalent to the nested logit (McFadden, 1974).

Equation 14 makes clear that the nested logit permits the unobservable components of a firm's utility to be correlated across choices belonging to the same nest. The multinomial logit, by contrast, imposes the restriction that unobservable utility is independent across choices. This "independence

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[24]The model required a normalization for identification. We imposed $\boldsymbol{\beta}_j = \mathbf{0}$ for the GP/SP outcome.

[25]As we describe in Appendix 8, the state in which a firm is based is determined on the basis of a firm's designation of a home office when available and by the location of the office with the largest number of lawyers otherwise.

[26]These covariates also account for the availability of a form in a state. $\beta_{js} = -\infty$ is consistent with the unavailability of form $j$ in state $s$.

[27]That is, $\mathbf{X}$ does not include a size dummy for GPs with 2 lawyers nor a state dummy for GPs based in Alaska.

of irrelevant alternatives" (IIA) can be unreasonable. For example, the multinomial logit implies that the ratio of the probability that a firm reorganizes as an LLP to the probability that the firm remains a GP would not respond to the introduction of the LLC form. In reality, because the LLP and LLC forms would seem to be fairly close substitutes, we might expect the probability that the firm would reorganize as an LLP to decrease relatively more than the decrease in the probability that the firm would remain a GP. The multinomial logit is easy to estimate, however, and the IIA property can be tested.

The results of the multinomial-logit analysis appear in the first column of Table 6. The null hypothesis that the IIA restriction is valid is strongly rejected (Small and Hsiao, 1985).[28] We therefore estimate a nested-logit model. We experiment with two nesting structures. First, we include the GP/SP form in one nest and the LLP, LLC, and PC forms in an alternative nest for forms that limit liability in some respect. Second, we include the LLP and LLC forms in a nest for "new" forms that limit owners' liability for others' misconduct and the GP/SP and PC forms in a nest for "old" forms. We are able to reject the first specification's IIA assumption.

### INSERT TABLE 6 HERE

Figure 4 illustrates two choice structures consistent with the second specification. Under these these structures, GPs that "choose" not to be in the 1999 sample are not problematic for our purposes. The assumed structures are reasonable insofar as absence from the 1999 sample is due to random noise in the data set or a systematic difference between firms that find it profitable to continue to operate and those that do not. As we discussed in Section 3, crude evidence on the exit rate of law firms accounts for approximately eighty percent of GP attrition between 1993 and 1999. The structures in Figure 4 may be less reasonable for those firms that merge or spin off, which we neither observe nor model.

### INSERT FIGURE 4 HERE

The results of the nested-logit analysis appear in Table 6's second column. Consistent with the rejection of the IIA property, a likelihood-ratio test fa-

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[28]For example, the Small-Hsiao $\chi^2$ statistic corresponding to the LLP outcome was 657.6, with 55 degrees of freedom.

vors the nested-logit model over the multinomial-logit model ($\sigma = 0$).[29] The estimated parameter for the variance decomposition ($\widehat{\sigma} = 0.945$) is substantially larger than zero yet still consistent with utility-maximizing behavior.[30] The parameter corresponding to the number of states in which a GP operated in 1993 and the decision between the LLP and GP/SP forms is significantly negative ($-0.30$), suggesting that multi-state operation makes the LLP form less attractive and perhaps controlling for unobserved firm-level heterogeneity. The parameter estimates corresponding to firm size and the decision to reorganize as an LLP or LLC, rather than remaining a GP/SP, are generally highly statistically significant.

The implications of these results for the relationship between firm size and choice of form appear at the bottom of Table 5. We estimate the change in the predicted probability of reorganizing under the counterfactual assumption that firms in a size class were large enough to be in the next larger size class. For example, the nested-logit analysis implies that the smallest GPs—those with 2 owners—would have been 7.5% more likely to reorganize either as an LLP or LLC had these firms been owned by 3-4 lawyers. The probability of reorganizing as an LLP or LLC increases with size for all firms. This finding contrasts with the pattern observed in the data in which GPs with 16-76 owners were more likely to reorganize than GPs with 77+ owners. The probability of reorganizing under any form also increases consistently with size. In particular, GPs with 16-76 owners would have been substantially more likely to reorganize as an LLP (13.4%) had they been larger but only somewhat less likely to reorganize as an LLC or PC ($-5.3\%$ and $-2.6\%$, respectively.) As with the observed data, the probability of reorganizing as a PC varies only modestly with firm size, suggesting that the liability shield for co-owners' professional misconduct that defines the LLP and LLC forms accounts for the relationship between size and reorganization.

Our analysis of firm size and reorganization is thus strongly consistent with our theoretical prediction that the owners of larger firms stand to benefit from limited liability, in particular, with respect to other owners' professional misconduct. An alternative interpretation is that the net benefits of reorganization increase systematically with some unobserved factor correlated with firm size. Our discussions with law-firm management as well as

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[29] $-2 \ln \left( L^r / L^u \right) = 4.60 \sim \chi^2 \left( 1 \right)$.

[30] We use heteroscedasticity-robust standard errors throughout our analyses (Wooldridge, 2002).

$0 \leq \sigma < 1$ is consistent with utility-maximizing behavior.

experts in business law have not suggested an alternative account of these findings.

## 4.2   Size, Reorganization and Growth

In addition to the relationship between firm size and reorganization, our theory makes other, subsidiary predictions about the post-conversion growth of firms that opt for limited liability.   In particular, it predicts that ceteris paribus, smaller ("marginal") adopters are likely to grow, while larger ("extra-marginal") adopters will shrink.   This prediction would be refuted if (for example) smaller limited-liability firms shrank, while larger firms grew. The theory further predicts that the level of growth decreases with firm size (at least initially) among limited-liability firms that grow.

Testing these predictions has proven to be challenging.   Firms in various industries typically change size over the course of their life cycles (Sutton, 1997).   Ideally, the growth of each GP that reorganized under a limited-liability business form could be compared to its growth had the firm remained a GP.  This counterfactual data is not available.   Our approach is to compare growth among firms that reorganized to growth among firms that remained GPs, conditional on firm size in 1993.

Table 7 describes the change in the number of owners, according to size in 1993 and form in 1999, observed within our sample.[31]   The smallest GPs that reorganized as LLPs grew by 0.7 owners on average between 1993 and 1999, while the smallest GPs that remained GPs grew by 0.1 owner, for a difference of +0.6 owners.   LLPs therefore grew faster than GPs.   The largest firms that became LLPs also grew faster—2.4 owners more on average—than the largest firms that remained GPs.   Hence the prediction that smaller firms cannot shrink while larger firms grow is not refuted.   This same observation applies to LLC and GPs.   The additional prediction that growth decreases with firm size is apparently not borne out, however.   For example, the relative growth of LLPs increased with firm size, reaching a maximum of +4.1 owners among firms with 16-76 owners.

This comparison of growth among limited-liability firms with growth

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[31] A substantial body of research investigates growth rates over firms' life cycles (Sutton, 1997).   Our theory also makes predictions about growth rates.   These predictions are implied by the predictions concerning absolute changes in the number of owners but do not imply the latter predictions.   Our focus in testing the theory is therefore on the more informative predictions concerning changes in the number of owners.

among GPs reveals the impact of limited liability on growth only if reorganization is uncorrelated with unobserved determinants of growth. The preceding section demonstrated that choice of form is related to the state in which a law firm was based; market conditions and hence growth may also be related to firm location. We therefore reexamine size, reorganization and growth with a regression that accounts for the state in which a firm was based. The number of states in which a firm operated is again included as a control for unobserved factors. Table 8 describes the results of this analysis.

The predicted changes in size for firms that operated within New York State appear at the bottom of Table 7.[32] These predictions are broadly similar to the observed changes. The hypothesis that small firms do not shrink while large firms grow cannot be rejected. However, growth increases with size among smaller firms. Growth among the largest LLPs exceeds that for the smallest LLPs, though the difference is not statistically significant. The evidence of relative shrinkage among large LLCs and PCs is statistically significant, albeit based on small numbers of observations.

Thus the evidence concerning size, reorganization and growth is mixed. The prediction that small limited-liability firms cannot shrink while large firms grow is not refuted. Indeed, very large LLCs as well as PCs appear to shrink in absolute as well as relative terms. However, relative growth tends to increase with size among smaller LLPs, LLCs and PCs.

# 5  Conclusion

This paper has investigated the impact of limited liability on the organization of legal services from both a theoretical and empirical perspective. Our analytical model predicts that limited liability may be of little value to smaller law firms. Larger firms, in contrast, adopt limited liability in order to extract additional rents from their clients. The evidence is consistent with this prediction (and strongly so). Large law firms whose liability had been unlimited were significantly more likely than small firms to reorganize as a Limited Liability Partnership or a Limited Liability Company when these business forms became available during the 1990s.

The theory also predicts (albeit somewhat less confidently) that smaller

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[32]Under our linear specification, state dummies merely shifted the intercept of the size-form-growth relationship. Hence the pattern with respect to relative growth (the bottom of Table 7) is identical across states.

limited-liability adopting firms may grow in order to gain leverage over clients. Moreover, larger limited-liability firms may shrink marginally so as to ensure that clients remain willing to pay for attorney effort. This set of predictions cannot be refuted with our data, but our assessment here is much less conclusive. On the one hand, there is modest evidence that the largest firms that reorganized as LLCs (or professional corporations) grew less, relative to general partnerships of the same size, than did smaller reorganizers. Contrary to the model's prediction, on the other hand, relative growth under limited liability tended to increase (and not decrease) with size among smaller deciles of firms.

To the extent that our theory is borne out by the data, however, it suggests that limited liability may have a significant influence on the division of surplus between large firms and their customers in the market for legal services. The relationship between limited liability and firm growth merits further investigation, given the somewhat mixed evidence on this point. The impact of limited liability on the organization of other professional services (such as accountants and physicians) would also be a fertile and interesting area to explore in future work.

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# 7    Appendix A

This appendix contains the central proofs in the analytical results from Section 3.

**Lemma 2:** *If Assumption B holds, the optimal high-effort inducing contract consists of the following terms:*

$$\beta = \max\left\{ u_0 + c + \phi - \frac{m\phi p_1}{(p_1 - p_0)} \cdot \left(1 - \gamma\phi\frac{(1 - p_1)}{(p_1 - p_0)}\right), -w\right\}$$

$$\mu = \beta + m\left(\frac{\phi}{(p_1 - p_0)}\right)$$

**Proof:** Suppose that all other attorneys are putting forth high effort. By also putting forth high effort (assuming that all attorneys have identical contracts of $(\mu, \beta)$), the representative attorney's expected monetary payoff will be

$$\beta + p_1 \cdot (\mu - \beta) - c - \phi$$

and a variance of

$$\frac{(\mu - \beta)^2}{m}(1 - p_1) \cdot p_1$$

On the other hand, by expending low effort, our attorney can reap an expected monetary payoff of:

$$\beta + \frac{1}{m}p_0 \cdot (\mu - \beta) + \frac{m - 1}{m}p_1 \cdot (\mu - \beta) - c$$

and a variance of:

$$\frac{1}{m^2}(\mu - \beta)^2 (p_0)(1 - p_0) + \frac{(m - 1)}{m^2}(\mu - \beta)^2 (p_1)(1 - p_1)$$

Thus, the attorney will expend high effort if and only if:

$$\beta + p_1 \cdot (\mu - \beta) - \gamma\left(\frac{(\mu - \beta)^2}{m}(p_1)(1 - p_1)\right) - (c + \phi)$$

$$\geq \beta + \frac{1}{m}p_0 \cdot (\mu - \beta) + \frac{m - 1}{m}p_1 \cdot (\mu - \beta)$$

$$-\gamma\left(\frac{1}{m^2}(\mu - \beta)^2 (p_0)(1 - p_0) + \frac{(m - 1)}{m^2}(\mu - \beta)^2 (p_1)(1 - p_1)\right) - c$$

which simplifies to:

$$\left(\frac{(\mu - \beta)}{m}\right)\left(1 - \frac{(\mu - \beta)}{m}\gamma \cdot (1 - p_1 - p_0)\right) \geq \frac{\phi}{(p_1 - p_0)}$$

36

Clearly, the client would like to choose the lowest level of $(\mu - \beta)$ that induces the attorney to expend high effort. After some analysis,[33] we obtain the following IC constraint[34] for the minimal level of $(\mu - \beta)$ that is incentive compatible:

$$(\mu - \beta) \geq \begin{cases} m \left( \dfrac{1 - \sqrt{1 - 4\gamma\phi \frac{(1 - p_1 - p_0)}{(p_1 - p_0)}}}{2\gamma(1 - p_1 - p_0)} \right) & \text{if } p_1 \neq 1 - p_0 \\[3ex] \left( \dfrac{m\phi}{(p_1 - p_0)} \right) & \text{if } p_1 = 1 - p_0 \end{cases}$$

Note that the simplest case is satisfied when $p_1 = 1 - p_0$. We focus on this case in what follows (though our results generally carry over to both cases, under some regularity assumptions).

To complete solving for the optimal high-effort contract, then, we substitute the high effort inducing terms $\mu$ in and set $\beta$ such that it satisfies both the attorney's wealth constraint and the attorney's participation constraint. From the above analysis, it is clear that $\mu > \beta$, so the sharpest wealth bound here is that $\beta > -w$.

Recall that the participation constraint is given by:

$$\beta + p_1 \cdot (\mu - \beta) - \gamma \left( \frac{(\mu - \beta)^2}{m} (p_1)(1 - p_1) \right) - (c + \phi) \geq u_0$$

Substituting the above expression for $\mu - \beta$ gives the following form of the participation constraint

$$\beta \geq \beta^{PC} \equiv \overbrace{u_0 + c + \phi}^{+} - \overbrace{\left( \frac{mp_1\phi}{(p_1 - p_0)} \right) \left( 1 - \gamma \left( \frac{\phi(1 - p_1)}{(p_1 - p_0)} \right) \right)}^{+}$$

---

[33]Note that the LHS of the above expression is a concave down parabola whenver $(1 - p_H - p_L) > 0$, with one root at zero and one strictly positive root. Thus, any $\alpha$ between the roots of the whole expression will solve. On the other hand, when $(1 - p_H - p_L) < 0$ the LHS is a concave up parabola with one root at zero and a strictly negative root. Here, anything larger than the largest root will solve. Finally, when $(1 - p_H - p_L) = 0$, the LHS is linear in $\alpha$.

[34]Let $\theta = \frac{\alpha Z}{m}$, so the equation becomes:

$$0 = \theta^2 \gamma (1 - p_H - p_L) - \theta + \frac{\phi}{(p_H - p_L)}$$

37

Note that the sign of $\beta$ is ambiguous, as the second term reperesents embodies the penalty $(\mu - \beta)$ that the firm pays if the case comes out negatively. In situations where $\beta^{PC} < 0$, the wealth constraint may bind, and in fact it does so whenever $\beta^{PC} < -w$, which is the condition on $\beta$ given in the Lemma. QED

**Proposition 1:** *If Assumptions A and B hold, the client will choose to implement high effort if and only the size of the firm satisfies $m \leq \hat{m}$, where*

$$\hat{m} = \begin{cases} m^* \equiv (p_1 - p_0) \frac{(p_1 - p_0)\overline{Z} + (u_0 + c + w)}{p_1 \phi} & \text{if } m \geq \tilde{m} \\ m^{**} \equiv (p_1 - p_0)^2 \frac{(p_1 - p_0)\overline{Z} - \phi}{\gamma \phi^2 p_1 (1 - p_1)} & \text{if } m < \tilde{m} \end{cases}$$

$$m \geq \tilde{m} \equiv \frac{(p_1 - p_0)}{\phi p_1} \cdot \frac{u_0 + c + \phi + w}{\left(1 - \gamma \phi \frac{(1 - p_1)}{(p_1 - p_0)}\right)} \tag{15}$$

**Proof:** When the client implements low effort, her net expected payoff is given by:

$$p_0 \overline{Z} - (u_0 + c)$$

This expected payoff does not turn on the size of the firm, nor the internal governance of it.

When, in contrast, the client wishes to implement high effort, her payoff depends on $m$ and $x$. Suppose first that $m \geq \tilde{m}$ (so that the wealth constraint binds, and $\beta = -w$). Here, the client's expected net payoff is given by:

$$p_1 \left(\overline{Z} - (\mu - \beta)\right) - \beta = p_1 \left(\overline{Z} - m \left(\frac{\phi}{(p_1 - p_0)}\right)\right) + w$$

Consequently, a high effort inducing contract is favored by the client if and only if the payoff the client receives exceeds her payoff in the low effort contract:

$$p_1 \left(\overline{Z} - m \left(\frac{\phi}{(p_1 - p_0)}\right)\right) + w \geq p_0 \overline{Z} - (u_0 + c)$$

$$(p_1 - p_0)\overline{Z} + (u_0 + c + w) \geq m \left(\frac{p_1 \phi}{(p_1 - p_0)}\right)$$

$$m \leq m^* \equiv (p_1 - p_0) \frac{(p_1 - p_0)\overline{Z} + (u_0 + c + w)}{p_1 \phi}$$

As it turns out, it need not be the case that $m^* > \widetilde{m}$.[35] In a situation where $m^* < \widetilde{m}$, there does not exist a firm size that (a) induces a high effort contract, and (b) involves a binding wealth constraint.

Now consider the incentive of the client to implement high effort when $m < \widetilde{m}$ (so that the participation constraint binds, but not the liquidity constraint). Here, the client's expected payoff is given by:

$$
\begin{aligned}
p_1\left(\overline{Z} - (\mu - \beta)\right) - \beta \;=\; & p_1\left(\overline{Z} - m\left(\frac{\phi}{(p_1 - p_0)}\right)\right) \\
& - \left(u_0 + c + \phi - \frac{m\phi p_1}{(p_1 - p_0)} \cdot \left(1 - \gamma\phi\frac{(1 - p_1)}{(p_1 - p_0)}\right)\right)
\end{aligned}
$$

Consequently, implementing high effort is worthwile, when the client's payoff exceeds the payoff she obtains under a low effort contract::

$$
p_1\overline{Z} - \frac{m\phi p_1}{(p_1 - p_0)} + \frac{m\phi p_1}{(p_1 - p_0)} \cdot \left(1 - \gamma\phi\frac{(1 - p_1)}{(p_1 - p_0)}\right) - (u_0 + c + \phi) \;\geq\; p_0\overline{Z} - (u_0 + c)
$$

$$
(p_1 - p_0)\overline{Z} - \phi \;\geq\; \frac{m\phi p_1}{(p_1 - p_0)} \cdot \left(\gamma\phi\frac{(1 - p_1)}{(p_1 - p_0)}\right)
$$

Solving for $m$, the client will induce high effort if and only if:

$$
m \leq m^{**} = (p_1 - p_0)^2 \frac{(p_1 - p_0)\overline{Z} - \phi}{\gamma\phi^2 p_1 (1 - p_1)}.
$$

---

[35] To see this, note that this would require:

$$
(p_1 - p_0)\overline{Z} + (u_0 + c_L + w) \;>\; \frac{u_0 + c + \phi + w}{\left(1 - \gamma\phi\frac{(1 - p_1)}{(p_1 - p_0)}\right)}
$$

$$
\Leftrightarrow
$$

$$
(p_1 - p_0)\overline{Z} - \phi \;>\; \gamma\phi(1 - p_1)\left(\overline{Z} + \frac{(u_0 + c + w)}{(p_1 - p_0)}\right)
$$

By Assumption A, the right hand side of this expression is strictly positive. However, so is the left hand side, and the sign is ambiguous.

As it turns out, it need not be the case that $m^{**} < \widetilde{m}$. In the case where $m^{**} > \widetilde{m}$,

$$
(p_1 - p_0)\overline{Z} + (u_0 + c + w) > \frac{u_0 + c + \phi + w}{\left(1 - \gamma\phi\frac{(1-p_1)}{(p_1-p_0)}\right)}
$$

$$
\Leftrightarrow
$$

$$
(p_1 - p_0)\overline{Z} - \phi > \gamma\phi(1 - p_1)\left(\overline{Z} + \frac{(u_0 + c + w)}{(p_1 - p_0)}\right)
$$

which corresponds to the second condition in the proposition. QED.

**Corrollary 1A:** *If Assumptions A holds, then $m^* > m^{**}$.*

**Corrollary 1B:** *If Assumptions A and B hold, then attorneys will earn positive economic rents if and only if $w \leq w^*$, where:*

$$
w^* \equiv \left(\frac{(p_1 - p_0)}{\gamma\phi(1 - p_1)} - 1\right)(p_1 - p_0)\cdot\overline{Z} - \frac{(p_1 - p_0)}{\gamma(1 - p_1)} - (u_0 + c)
$$

**Corrollary 1C:** *If Assumptions A and B hold, then attorneys will earn positive economic rents if and only if $\overline{Z} \geq \overline{Z}^*$, where:*

$$
\overline{Z}^* \equiv (u_0 + c + w)\left(\frac{1}{((p_1 - p_0) - \gamma\phi(1 - p_1))} - 1\right) + \frac{\phi}{((p_1 - p_0) - \gamma\phi(1 - p_1))}
$$

**Proof of 1A:** The proof consists of a simple comparison of $m^*$ to $m^{**}$ :

$$
(p_1 - p_0)\frac{(p_1 - p_0)\overline{Z} + (u_0 + c + w)}{p_1\phi}
$$

$$
\begin{aligned}
(m^* - m^{**}) &= (p_1 - p_0)\frac{(p_1 - p_0)\overline{Z} + (u_0 + c + w)}{p_1\phi} - (p_1 - p_0)^2\frac{(p_1 - p_0)\overline{Z} - \phi}{\gamma\phi p_1(1 - p_1)}\\
&= \frac{(p_1 - p_0)}{p_1\phi}\left[\overline{Z}(p_1 - p_0)\left(1 - \frac{(p_1 - p_0)}{\gamma\phi(1 - p_1)}\right) + \left(u_0 + c + w + \phi\cdot\frac{(p_1 - p_0)}{\gamma(1 - p_1)}\right)\right] > 0
\end{aligned}
$$

where the sign on $\left(1 - \frac{(p_1 - p_0)}{\gamma\phi(1 - p_1)}\right)$ follows from Assumption A.

**Proof of 1B-C:** Note from proposition 1 that the following decision rules are adopted by the client:

$$\begin{array}{ccc} & m < \tilde{m} & m \geq \tilde{m} \\ \text{Implement High Effort If} & m \leq m^{**} & m \leq m^* \\ \text{Implement Low Effort If} & m > m^{**} & m > m^* \end{array}$$

So we still need to check whether the relevant regions described above exist, and if they do, how the firm will organize itself. Our task is simplified a bit by noting that the attorneys in a firm receive rents only when (a) high effort is implemented; and (b) the wealth constrained binds. Equivalently, then, the operative region a firm finds itself in is where $m \in [\tilde{m}, m^*]$. Everywhere else, they will earn no rents. However, in any event they will not earn rents unless $\tilde{m} \leq m^*$. So the first task is to ask when $[\tilde{m}, m^*]$ exists. For it to exist, the following must be true:

$$\widetilde{m} = (p_1 - p_0) \cdot \frac{u_0 + c + \phi + w}{\phi p_1 \cdot \left(1 - \frac{\gamma \phi (1 - p_1)}{(p_1 - p_0)}\right)} \leq (p_1 - p_0) \frac{(p_1 - p_0)\overline{Z} + (u_0 + c + w)}{p_1 \phi} = m^*$$

$$\Leftrightarrow$$

$$w \leq w^* = \left(\frac{(p_1 - p_0)}{\gamma \phi (1 - p_1)} - 1\right)(p_1 - p_0) \cdot \overline{Z} - \frac{(p_1 - p_0)}{\gamma (1 - p_1)} - (u_0 + c)$$

$$\Leftrightarrow$$

$$\overline{Z} \geq \overline{Z}^* \equiv \frac{(u_0 + c + w)(1 - (p_1 - p_0) + \gamma \phi (1 - p_1)) + \phi}{((p_1 - p_0) - \gamma \phi (1 - p_1))}$$

QED.

$* \; * \; *$

**Proposition 2:** *Suppose that Assumptions A, B, and C hold. If $\overline{Z} \geq \overline{Z}^*$, the firm selects a size of $m = m^*$. Otherwise, the firm selects any size $m \in [0, m^{**}]$.*

**Proof:** If $\overline{Z} \geq \overline{Z}^*$, then under Assumptions A and B we know that $\tilde{m} \leq m^*$, and thus the firm will choose a size in the interval $[\tilde{m}, m^*]$, since rents are zero for all other firm size. The representative attorney's expected utility under an optimal contract for a firm size in this interval is given by:

$$\pi(w, m^*) = -(w + c + \phi) + p_1 \cdot m \left(\frac{\phi}{(p_1 - p_0)}\right)\left(1 - \frac{\gamma \phi (1 - p_1)}{(p_1 - p_0)}\right)$$

Note that this value is strictly increasing in $m$, and thus the firm will grow to the maximal size in this interval. If $\overline{Z} < \overline{Z}^*$, in contrast, the representative

attorney will always garner zero rents, and thus the choice of organizational size is not unique. However, Assumption C implies that this choice must be on the interval $[0, m^{**}]$. QED.

$* * *$

**Proposition 3:** *Suppose that Assumptions A, B & C hold. If $\overline{Z} \geq \overline{Z}^*$, the firm will adopt a limited liability business form when it becomes available, and its firm size will shrink marginally in size. In addition, all firms on the interval $\overline{Z} \in \left[ \overline{Z}', \overline{Z}^* \right]$ will also adopt the limited liability form and will grow inframarginally in size, where*

$$\overline{Z}' = \frac{\left( u_0 + c + w' \right) \left( 1 - (p_1 - p_0) + \gamma \phi \left( 1 - p_1 \right) \right) + \phi}{\left( (p_1 - p_0) - \gamma \phi \left( 1 - p_1 \right) \right)} < \overline{Z}^*$$

*Firms on the interval $\overline{Z} \in \left[ \overline{Z}', \overline{Z}^* \right]$ will neither convert nor change in size.*

**Proof:** The textual discussion demonstrates the proof for firms such that $\overline{Z} \geq \overline{Z}^*$. For firms on the interval $\overline{Z} \in \left[ \overline{Z}', \overline{Z}^* \right]$, note that the Proposition is simply a restatement of Proposition 2 evaluated at $w'$. The same is true for firms on the interval $\overline{Z} \in \left[ 0, \overline{Z}' \right]$.

# 8 Appendix B

This appendix describes our longitudinal data set on American law firms. Our objective here is to give the interested reader an overview of its development and thus an appreciation of its strengths and weaknesses, as well as a sense of its contents.

Like Hillman's (2003) cross-sectional data set for a more recent period, ours derives from the Martindale Hubbell Law Directory. Hillman observes that Martindale Hubbell describes its directory as the "most complete listing of lawyers and firms" in the United States. Indeed, the Directory includes lawyers not only in law firms but also in government service, business, academia, retirement and perhaps even on temporary leave from the labor force. Appearance in the Directory is voluntary, so that completeness of the listings is a potential concern. Martindale Hubbell was unable to provide Hillman

with an official assessment of this issue, though a representative did estimate that eighty to ninety percent of firms are included.

We obtained computer-readable versions of the Fall 1993 and Fall 1999 editions of the Directory. These databases are structured to distinguish between firms and individuals, including lawyers and their support staff. A unique record exists for each of a firm's offices and each of a lawyer's associations with a location (for example, multiple offices of the same firm, place of retirement). The nearly eight hundred thousand records in the 1993 database were exported in batches of two hundred. We could and did export much larger batches of records from the similarly sized 1999 database, though at a cost of omitting some fields. These procedures also failed to preserve the inherent structure of the databases. The lack of a "cross walk" between lawyers, firms and offices posed significant challenges for transforming the exported data into an analytical data set, as did the absence of unique identifiers for lawyers within the 1993 database and for firms in both years.

The exported data nevertheless preserve a wealth of information. Of relevance to our context, each firm-office record includes the firm's name and the office address. Firm-office records in 1999 also include a marker for the "main office" for some multi-office firms. Each lawyer-location record includes the lawyer's name and location and, when appropriate and available, firm affiliation and title. Lawyer-location records in 1999 also include a unique lawyer identifier, namely, the International Standard Lawyer Number (ISLN). On the basis of this information, we assembled our data set in four steps.

## 8.1 Identifying law firms and their office locations

In the first step of assembling the data set, we identified law firms, their office locations and their main offices. A firm-office record necessarily identifies a law firm. The presence of an ISLN generally served to distinguish between firm-office and lawyer-location records in the 1999 data. For the 1993 data, after having extracted roughly a quarter of the database, we discovered that firms and lawyers could be exported separately. Where firms and lawyers had been exported together, we generally relied on the presence of fields relevant only to firms (for example, firm size) to distinguish these records.

Due to the lack of unique firm identifiers in the exported data, we defined a firm in each year as the set of offices that share a common name in the Directory. These names typically include the surnames of prominent members

and in many cases a designator for the firm's organizational form, e.g., "P.C." Our matching procedure retained such designators in firm names. As row 2 of Table 10 indicates, our approach identified 65,620 firms (in 74,966 offices) in 1993 and 65,999 firms (in 75,409 offices) in 1999. As of Summer 2002, Hillman found 65,139 firms in the Directory, as derived from LexisNexis.

Nevertheless, these statistics reflect the mistreatment of some unaffiliated offices as a single firm and also of affiliated offices as distinct firms. We term these errors within-year overlinkages and underlinkages, respectively. Within-year overlinkages arise because surnames (or combinations thereof) are not unique within the Directory. The inclusion of designators in firm names helps limit overlinkages.

Within-year underlinkages arise for two reasons. First, some multi-state firms (as indicated in the databases) operate offices under different business forms. That is, form designators mitigate overlinkage error at a cost of greater underlinkage. Second, the Directory itself is occasionally inconsistent in its nomenclature. For example, a letter in the firm name may be capitalized in some firm-office records but not in others. We therefore standardized firm names in various respects, e.g., by converting all letters to lower-case. While standardization can cause overlinkages, we are not aware of any examples, and underlinkages due to inconsistencies in nomenclature were common.[36] Some underlinkages remain. Of particular relevance, our standardization of names was imperfect, and the Directory sometimes reported different organizational forms for offices apparently belonging to the same firm in the same state.

We were able to assess the prevalence of errors in identifying firms and their offices. We identified potential underlinkages due to the retention of designators in firm names by matching firms based on their names stripped of designators. As many as 1,143 firms in 1993 and 1,622 firms in 1999 may be underlinked. In contrast with underlinkages, a rough assessment of overlinkages was not feasible. As one would expect, our experience has been that sole practitioners and small partnerships can be mistakenly linked due to common surnames.

For each of these firms we then identified a main office. This task was trivial for firms with a single office. For multi-office firms, we first determined whether the Directory designated a home office, as was occasionally the case in 1999. If not, the office with the greatest number of lawyers was classified

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[36] Inconsistencies across years were especially prevalent.

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as the main office. The distributions of firms by state of main office in 1993 and 1999 are qualitatively similar to that found by Hillman for 2002.[37]

Some lawyer records included only a lawyer's name and address, but no institutional affiliation. The status of these lawyers is unknown.[38] Some may be practicing on their own, perhaps in a relatively informal setting. Lawyers of unknown status are quite common. If these lawyers were indeed in active practice, row 1 of Table 10 indicates that the number of firms would rise to 236,099 in 1993 and 265,713 in 1999.

## 8.2  Measuring firm size

Next we measured the size of law firms. While firm size may admit a variety of meanings, our analysis focuses on those lawyers who own firms.

We therefore identified lawyers associated with each of a firm's offices and their places within the firm's hierarchy, in particular, their ownership status. Because the Directory includes records for support staff, we first distinguished between lawyers and staff. The presence of an ISLN indicated a lawyer in the 1999 data. For the 1993 data, we generally relied on an individual's title: Member, Associate, and Of Counsel indicated a lawyer. In both years a title of Member generally identified a lawyer with an ownership interest. The number of lawyers and owners in a firm could then be obtained by aggregating across a firm's offices.[39]

We assessed the accuracy of this procedure by examining the resulting data on firm size for anomalies and also by comparing the derived numbers of lawyers and owners to the database for a subsample of firms. No lawyer could be associated with 4,231 firms in 1993 and 856 firms in 1999. Inspection of some of these cases revealed that the Directory itself sometimes fails to associate any lawyers with a firm. Apparently random inconsistencies in firm names between firm-office and lawyer-location records also account for these events.[40] When at least one lawyer could be associated with a firm, the size

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[37]These distributions are available from the authors upon request.

[38]The Directory generally indicated when a lawyer is retired, semi-retired, in military service, or otherwise engaged in an activity other than the practice of law. These are not the lawyers of unknown status to which we are referring.

[39]In the apparently rare event that the Directory indicates that a lawyer practices at multiple offices, our algorithm attempts to count a lawyer only once and appears to be at least somewhat successful in doing so.

[40]Inconsistencies in office addresses might also contribute, though we are not presently

data appear to be largely accurate. For an additional 852 (696) firms in 1993 (1999), no owners could be identified. Again, when our procedure could associate at least one owner with a firm, the resulting data seemed accurate.

Excluding firms that could not be associated with an owner, the average number of lawyers and owners per firm was 5.41 and 3.61, respectively, in 1993; the corresponding figures were 5.75 and 3.81 in 1999. There is substantial variation in each of these measures. For example, the standard deviations of the number of lawyers and owners were 19.40 and 9.17, respectively, in 1993.

The average numbers of lawyers per firm in the data set are somewhat larger than those derived from the Economic Censes of 1992 and 1997, namely, 2.96 and 2.94, respectively (U.S. Census Bureau, 1995, 2000).[41] This finding is consistent with Hillman's (2003) hypothesis that large firms are more likely to be represented in the Directory. Additionally, under the assumption that all (rather than no) lawyers of unknown status are sole practitioners, these averages decline to 2.15 in 1993 and 2.16 in 1999. We conclude that our size data are reasonably reliable.

## 8.3 Characterizing organizational form

We then characterized the organizational form of law firms. Following Hillman (2003), we focused on five broad forms. These include limited liability partnership (LLP), limited liability company (LLC), professional corporation/professional association (PC/PA), general partnership (GP), and sole proprietorship (SP).

The classification of firms began with any designators appearing at the conclusion of firm names, for example, the designator "P.C." within the firm name "Talley and Romley, P.C." Various designators may correspond to a form within and across states. We associated designators with PC/PAs, LLPs and LLCs on the basis of the state-specific compendium of permissible forms and their designators that Hillman (2003) developed from his review of state policies. In Arkansas, for example, an LLC may include "PLC" or "PLLC" in its firm name. Furthermore, we classified a firm as a PC/PA if its designator did not appear in Hillman's list of PC/PA designators for its

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aware of any.

[41] To the best of our knowledge, the average number of owners per firm cannot be derived from published reports.

home state, yet the designator always corresponded to a PC/PA elsewhere. For example, a "Chartered" firm in Arkansas was classified as a PC/PA.

We also used designators to assess our own characterization of state policy in 1993 and 1999 (see Appendix C), the applicability of Hillman's compendium to our timeframe, and the quality of Martindale Hubbell's information on organizational form. After identifying and incorporating common variants of permissible designators (for example, "Professional Limited Company" for "PLC"), there were 43 (148) firms with dubious forms in 1993 (1999). Some of these had "LLC" or "LLP" as a designator even though their home state did not permit it; others included common phrases that lacked an unambiguous association with one of Hillman's broad forms. These firms are excluded from our analytical sample, as indicated in row 5 of Table 10.[42]

Firms whose names lack any of the relevant designators for PC/PAs, LLCs and LLPs were assigned to the GP and SP categories as follows: If there is one lawyer, "associates" appears in the firm name, or the name includes at most a single surname, the firm was a SP.[43] All other firms were classified as GPs. As Hillman notes, the GP category is underinclusive because a partnership with a single surname in its name is treated as a SP

Table 1 characterizes the organizational structure of the legal-services industry in 1993 and 1999.

## 8.4 Constructing a longitudinal sample

In the final step we identified firms that operated in both 1993 and 1999. Such an undertaking requires a definition of the firm over time. Our theoretical analysis is focused on joint decisions concerning business form and the number of owners. We wish to study firms that are stable in other respects, abstracting, for example, from sharp changes in firm boundaries arising from mergers and spinoffs.

We developed an algorithm that attempts to identify the set of continuing firms that evolve only with respect to form. As with the task of linking offices

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[42]The number of firms in 1993 declines by more than 43 because some matched firms appear to operate under a dubious form in 1999. The number of firms declines by more than 148 in 1999 for a similar reason. We explain our matching process in the next subsection.

[43]Whereas Hillman (2003) visually inspected the names of firms that did not meet either of the first two criteria for a SP, our algorithm identifies firms with a single surname by searching for the word "and" or an ampersand in the firm name.

to firms, two types of errors may arise. Intertemporal overlinkages arise when distinct firms in 1993 and 1999 are linked. Intertemporal underlinkages arise when the records for the same firm are not linked across years.

This algorithm first matched firms on their names. Prior to matching, names were stripped of designators, so as not to exclude firms that reorganized under a different business form in the interim. When firms matched on the stripped name, we verified that the city and state of an office in 1999 matched those of an office in 1993. This requirement limited the prevalence of intertemporal overlinkages that would result from matching on stripped names, at a potential cost of underlinking firms that relocated. After matching 23,812 firms on name and location, we used an inconsistency—namely, the existence of multiple main offices—to identify 171 firms that were distinct in the 1999 cross section but overlinked across years.[44] These firms are excluded from our analytical sample, as indicated in row 7 of Table 10. Turning to intertemporal underlinkages, our algorithm fails to identify a continuing firm whose name was modified to add or remove the surname of an owner. A systematic assessment of the prevalence of intertemporal underlinkages is difficult. We believe that this is a rare event.

The sample of valid firms that were matched includes 23,641 firms. That is, 39.1% of the non-overlinked firms in the 1993 cross section continued to operate in 1999. 53.0% of owners and 56.6% of lawyers in 1993 are affiliated with these firms. The match rates are even higher for GPs—50.4% of these firms continued to operate in 1999.

# 9    Appendix C

Table 9 indicates the date at which each state permitted a law firm to organize as an LLP or LLC. In general, when a statute specifically authorizing a business form for law firms followed a general limited-liability statute, the form plausibly became available only with the specific statute. A similar argument applies when judicial approval followed a general statute. Statutory

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[44]In some cases the underlying database identifies offices in a particular year with the same stripped name but different designators as affiliated with the same firm. If the database is correct, our algorithm for linking firms to offices mistakenly treats these "firms" as distinct in 1999. (In these cases our algorithm for linking firms over time corrects this within-year underlinkage, though these firms are then excluded because there are multiple home offices.) We cannot assess the prevalence of such within-year underlinkages for firms that are not matched across years by name and location.

and judicial citations are available from the authors upon request.

**INSERT TABLE 9 HERE**

**Figure Legends**

Figure 3: Total Rate of Reorganization as LLPs or LLCs by 1993 GPs

Figure 4: Nesting Structures Consistent with the Reorganization Analy-
sis

Figure 3: Total Rate of Reorganization as LLPs or LLCs by 1993 GPs

GP in '93

Not in '99
sample

In '99
sample

Old form

New form

GP

PC

LLP

LLC

GP in '93

Not in '99
sample

Old form
in '99

New form
in '99

GP

PC

LLP

LLC
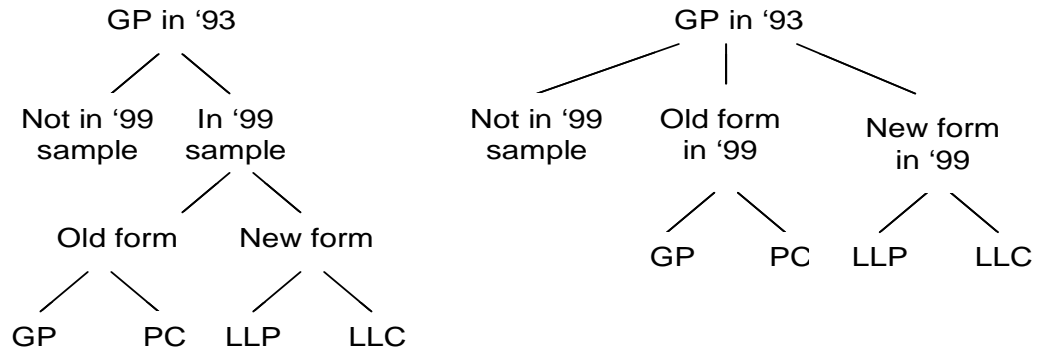
Figure 4: Nesting Structures Consistent with the Reorganization Analysis

Table 1: Shares of Law Firms by Business Form

|       | 1993      | 1999      | 2002      |             |
|-------|-----------|-----------|-----------|-------------|
|       | All firms | All firms | All firms | 50+ lawyers |
| GP    | 40.6%     | 30.2%     | 26.2%     | 14.2%       |
| LLP   | 0.43%     | 7.2%      | 9.3%      | 47.9%       |
| LLC   | 0.04%     | 3.7%      | 7.0%      | 8.6%        |
| PC    | 32.9%     | 47.7%     | 47.8%     | 29.4%       |
| SP    | 26.0%     | 11.3%     | 9.7%      | n/a         |

Note: Hillman (2003) is the source of the 2002 data.

Table 2: Shares of LLPs and LLCs in 1999, by Business Form in 1993

|  | LLP | LLC |
|---|---|---|
| GP | 26.8% | 13.3% |
| LLP | 2.3% | 0.0% |
| LLC | 0.0% | 0.6% |
| PC | 0.5% | 1.1% |
| SP | 0.7% | 0.9% |
| Not in 1993 sample | 69.8% | 84.0% |

Table 3: Shares of GPs in 1993, by Business Form in 1999

| | |
|---|---|
| GP | 39.5% |
| LLP | 5.2% |
| LLC | 1.3% |
| PC | 2.2% |
| SP | 2.0% |
| Not in 1999 sample | 49.8% |

Table 4: Sample Statistics

|  | Mean | Std. Dev. |
|---|---|---|
| | *Firm characteristics* | |
| Number of owners in 1993 | 5.70 | 15.68 |
| 2 owners | 54.5% | — |
| 3-4 owners | 26.3% | — |
| 5-8 owners | 10.0% | — |
| 9-15 owners | 4.2% | — |
| 16-76 owners | 4.0% | — |
| 77+ owners | 1.0% | — |
| Number of states with offices in 1993 | 1.22 | 0.78 |
| | *Outcomes* | |
| GP/SP in 1999 | 82.7% | — |
| LLP in 1999 | 10.3% | — |
| LLC in 1999 | 2.6% | — |
| PC in 1999 | 4.4% | — |
| Change in number of owners, 1993-1999 | 0.83 | 6.70 |
| | *Number of observations* | |
| | 11,954 | |

Table 5: Reorganization among 1993 GPs

*Probability of reorganizing*

|  | Observed | | | |
| --- | --- | --- | --- | --- |
|  | LLP + LLC | LLP | LLC | PC |
| 2 owners | 3.7 | 2.7% | 1.0 | 4.0 |
| 3-4 owners | 11.0 | 8.7% | 2.4 | 4.3 |
| 5-8 owners | 29.2 | 22.7% | 6.5 | 5.9 |
| 9-15 owners | 50.3 | 40.4% | 9.9 | 5.9 |
| 16-76 owners | 61.3 | 51.7% | 9.7 | 5.3 |
| 77+ owners | 51.7 | 50.0% | 1.7 | 2.5 |

*Mean change in probability when firms move up a size class*

|  | Observed | | | |
| --- | --- | --- | --- | --- |
|  | LLP + LLC | LLP | LLC | PC |
| 2 owners | 7.4 | 6.0 | 1.4 | 0.3 |
| 3-4 owners | 18.2 | 14.1 | 4.1 | 1.5 |
| 5-8 owners | 21.1 | 17.7 | 3.3 | 0.1 |
| 9-15 owners | 11.1 | 11.3 | -0.2 | -0.7 |
| 16-76 owners | -9.7 | -1.7 | -8.0 | -2.7 |

|  | Multinomial logit | | | |
| --- | --- | --- | --- | --- |
|  | LLP + LLC | LLP | LLC | PC |
| 2 owners | 7.6 | 6.3 | 1.3 | -1.8 |
| 3-4 owners | 19.1 | 14.7 | 4.4 | 2.4 |
| 5-8 owners | 20.6 | 16.5 | 4.1 | 4.8 |
| 9-15 owners | 10.8 | 10.7 | 0.1 | 4.1 |
| 16-76 owners | 7.3 | 13.7 | -6.4 | -1.9 |

|  | Nested logit | | | |
| --- | --- | --- | --- | --- |
|  | LLP + LLC | LLP | LLC | PC |
| 2 owners | 7.5 | 6.3 | 1.2 | 0.4 |
| 3-4 owners | 19.1 | 14.5 | 4.5 | 1.6 |
| 5-8 owners | 20.7 | 16.4 | 4.3 | 0.4 |
| 9-15 owners | 10.9 | 11.6 | -0.7 | -0.2 |
| 16-76 owners | 8.1 | 13.4 | -5.3 | -2.6 |

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Table 6: Analysis of Choice of Form in 1999 Among 1993 GPs

| | Specification | |
| --- | --- | --- |
| | *Multinomial logit* | *Nested logit* |
| | Parameter Estimates | |
| $\sigma$ | — | 0.945** (0.248) |
| *LLP* | | |
| Constant | -29.49** (1.03) | -7.79** (0.42) |
| 3-4 owners | 1.33** (0.10) | 1.25** (0.15) |
| 5-8 owners | 2.70** (0.11) | 2.60** (0.15) |
| 9-15 owners | 3.79** (0.14) | 3.63** (0.21) |
| 16-76 owners | 4.43** (0.15) | 4.19** (0.27) |
| 77+ owners | 4.97** (0.30) | 4.66** (0.94) |
| Number of states with offices in 1993 | -0.33** (0.07) | -0.30$^+$ (0.17) |
| State dummies | Yes | Yes |
| *LLC* | | |
| Constant | -36.61** (1.04) | -8.99** (0.32) |
| 3-4 owners | 0.98** (0.18) | 1.21** (0.24) |
| 5-8 owners | 2.44** (0.18) | 2.57** (0.20) |
| 9-15 owners | 3.47** (0.22) | 3.60** (0.23) |
| 16-76 owners | 3.81** (0.24) | 4.14** (0.33) |
| 77+ owners | 2.81** (0.81) | 4.52** (1.21) |
| Number of states with offices in 1993 | -0.33** (0.15) | -0.30 (0.19) |
| State dummies | Yes | Yes |
| *PC* | | |
| Constant | -2.10** (0.75) | -0.12 (0.61) |
| 3-4 owners | 0.18 (0.11) | 0.01 (0.06) |
| 5-8 owners | 0.80** (0.14) | 0.04 (0.21) |
| 9-15 owners | 1.27** (0.21) | 0.07 (0.29) |
| 16-76 owners | 1.53** (0.23) | 0.09 (0.39) |
| 77+ owners | 1.03 (0.66) | 0.06 (0.39) |
| Number of states with offices in 1993 | -0.27* (0.14) | -0.02 (0.09) |
| State dummies | Yes | Yes |
| Statistics | | |
| Observations | 11,954 | |
| Log likelihood | -5710.1 | -5707.8 |
| Model degrees of freedom | 162 | 163 |

Heteroscedasticity-robust standard errors appear in parentheses. $^+$ denotes significance at the 10% level, * at 5%, and ** at 1%.

Table 7: Change in Number of Owners between 1993 and 1999 among 1993 GPs

| | Mean change, observed | | | | | | |
|---|---|---|---|---|---|---|---|
| | GP/SP | LLP | LLC | PC | LLP-GP/SP | LLC-GP/SP | PC-GP/SP |
| 2 owners | 0.1 | 0.7 | 0.7 | 0.2 | 0.6 | 0.6 | 0.1 |
| 3-4 owners | 0.2 | 1.0 | 0.9 | 0.5 | 0.9$^\dagger$ | 0.7 | 0.4 |
| 5-8 owners | 0.6 | 1.5 | 1.1 | 1.2 | 0.9$^\dagger$ | 0.5 | 0.6 |
| 9-15 owners | 0.8 | 2.5 | 2.3 | -0.2 | 1.7$^\dagger$ | 1.5 | -1.0 |
| 16-76 owners | 4.1 | 8.3 | 3.1 | 0.4 | 4.1$^\dagger$ | -1.0 | -3.7$^\dagger$ |
| 77+ owners | 28.0 | 30.4 | -4.5 | 2.0 | 2.4 | -32.5$^\dagger$ | -26.0$^\dagger$ |

| | Mean change, predicted, for law firms operating in New York State | | | | | | |
|---|---|---|---|---|---|---|---|
| | GP/SP | LLP | LLC | PC | LLP-GP/SP | LLC-GP/SP | PC-GP/SP |
| 2 owners | -0.1 | 0.5 | 0.4 | 0.0 | 0.6 | 0.5 | 0.1 |
| 3-4 owners | -0.2 | 0.8 | 0.4 | 0.2 | 1.0$^\dagger$ | 0.6 | 0.4$^\dagger$ |
| 5-8 owners | 0.0 | 1.3 | 0.8 | 1.0 | 1.3$^\dagger$ | 0.8 | 1.0$^\dagger$ |
| 9-15 owners | 0.1 | 2.1 | 1.9 | -0.5 | 2.1$^\dagger$ | 1.8$^\dagger$ | -0.6 |
| 16-76 owners | 3.0 | 7.5 | 2.4 | -0.4 | 4.5$^\dagger$ | -0.6 | -3.4 |
| 77+ owners | 24.4 | 26.7 | -7.2 | -2.5 | 2.3 | -31.6$^\dagger$ | -27.0$^\dagger$ |

$^\dagger$ denotes that the mean growth differential is different than among 2-owner firms at 10% significance.

Table 8: Analysis of Change in Number of Owners

| | Parameter Estimates |
|---|---|
| Constant | -1.53* (0.62) |
| LLP in '99 | 0.62** (0.12) |
| LLC in '99 | 0.50** (0.16) |
| PC in '99 | 0.09 (0.08) |
| 3-4 owners | -0.08 (0.05) |
| 5-8 owners | 0.13 (0.16) |
| 9-15 owners | 0.2 (0.36) |
| 16-76 owners | 3.12** (1.11) |
| 77+ owners | 24.55** (6.55) |
| 3-4 owners*LLP in '99 | 0.40* (0.17) |
| 5-8 owners*LLP in '99 | 0.65** (0.24) |
| 9-15 owners*LLP in '99 | 1.45** (0.46) |
| 16-76 owners*LLP in '99 | 3.86** (1.41) |
| 77+ owners*LLP in '99 | 1.67 (9.77) |
| 3-4 owners*LLC in '99 | 0.13 (0.34) |
| 5-8 owners*LLC in '99 | 0.88$^{+}$ (0.5) |
| 9-15 owners*LLC in '99 | 1.34* (0.68) |
| 16-76 owners*LLC in '99 | -1.14 (1.98) |
| 77+ owners*LLC in '99 | -32.11$^{+}$ (16.59) |
| 3-4 owners*PC in '93 and '99 | 0.27$^{+}$ (0.16) |
| 5-8 owners*PC in '93 and '99 | 0.88$^{+}$ (0.5) |
| 9-15 owners*PC in '93 and '99 | -0.71 (0.75) |
| 16-76 owners*PC in '93 and '99 | -3.46 (2.31) |
| 77+ owners*PC in '93 and '99 | -27.06$^{+}$ (13.95) |
| Number of states with offices in 1993 | 1.47* (0.57) |
| State dummies | Yes |
| | Statistics |
| Observations | 11,954 |
| $R^2$ | 0.220 |

Heteroscedasticity-robust standard errors appear in parentheses. $^{+}$ denotes significance at the 10% level, * at 5%, and ** at 1%.

Table 9: Date of Introduction of LLP and LLC Forms for Law Firms

| State | LLP | LLC | State | LLP | LLC |
|-------|--------|--------|-------|--------|--------|
| AK | Jan-97 | Jul-95 | MT | Oct-95 | Oct-93 |
| AL | Jan-97 | Oct-93 | NC | Oct-93 | Oct-93 |
| AR | Mar-97 | Apr-93 | ND | Mar-95 | Aug-93 |
| AZ | Jul-94 | Sep-92 | NE | Dec-99 | Dec-99 |
| CA | Oct-95 | n/a | NH | Aug-96 | Jul-93 |
| CO | May-95 | Dec-95 | NJ | Jan-97 | Jan-97 |
| CT | Jan-96 | Oct-93 | NM | Jun-95 | n/a |
| DC | May-97 | Jul-94 | NV | Oct-95 | n/a |
| DE | Oct-93 | May-97 | NY | Oct-94 | Oct-94 |
| FL | Jul-96 | Oct-93 | OH | Jul-94 | Jul-94 |
| GA | Aug-96 | Mar-94 | OK | Nov-96 | Nov-95 |
| HI | Apr-97 | Jul-99 | OR | Jan-96 | May-95 |
| IA | Aug-94 | Jul-92 | PA | Feb-95 | Feb-95 |
| ID | Jul-95 | Jun-93 | RI | Jan-98 | Jul-02 |
| IL | Jul-03 | Mar-97 | SC | Jun-94 | Jun-94 |
| IN | Jan-98 | Jan-98 | SD | Jul-95 | Jul-93 |
| KS | Apr-94 | Jan-90 | TN | Jul-95 | Jun-94 |
| KY | Feb-00 | Feb-00 | TX | Aug-91 | Aug-91 |
| LA | Jul-92 | Jul-92 | UT | May-94 | Jul-91 |
| MA | Jan-98 | Jul-96 | VA | Jul-94 | Jul-92 |
| MD | Oct-94 | Oct-93 | VT | Jan-99 | Jul-96 |
| ME | Jul-96 | Jan-95 | WA | Jul-95 | Oct-94 |
| MI | Oct-94 | Jun-93 | WI | Jul-97 | Jul-97 |
| MN | Aug-94 | Jan-93 | WV | Jun-96 | Jun-96 |
| MO | Aug-95 | Jan-94 | WY | Jun-00 | Jul-93 |
| MS | Jul-95 | Jul-94 | | | |

Table 10: Tracing the Development of the Analytic Data Set

| Row | Sample | 1993 | 1999 |
|---|---|---|---|
| 1 | Firms inclusive of potential sole practitioners | 236,099 | 265,713 |
| 2 | Excluding potential sole practitioners | 65,620 | 65,999 |
| 3 | Excluding firms with no lawyers | 61,389 | 65,143 |
| 4 | Excluding firms with no owners | 60,486 | 64,357 |
| 5 | Excluding firms of dubious form | 60,424 | 64,204 |
| 6 | Firms matched by name and location across years | 23,812 | |
| 7 | Matched firms excluding known intertemporal overlinkages | 23,641 | |
| 8 | Excluding firms based in states that didn't permit LLCs or LLPs as of 1999 | 23,098 | |
| 9 | Analytical sample, including 1993 GPs that operated in 1999 | 11,954 | |