Search, Bargaining, and Agency in the Market for Legal Services*

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ABSTRACT

We show that, in the context of the market for a professional service, adverse selection problems can sufficiently exacerbate moral hazard considerations so that even though all agents are risk neutral, welfare can be reduced by allowing the agent to "buy the firm" from the principal. In particular, we model the game between an informed seller of a service (a lawyer) and an uninformed buyer of that service (a potential client) over the choice of compensation for the lawyer to take a case to trial, when there is post-contracting investment by the lawyer (effort at trial) that involves moral hazard. Clients incur a one-time search cost to contact a lawyer, which parametrically influences the market power of the lawyer when he makes a demand of the client for compensation for his service. The client uses the demand to decide whether to contract with the lawyer or to visit a second lawyer so as to seek a second option, which incurs a second search cost. Seeking a second option shifts the bargaining power to the client because she can induce the lawyers to bid for the right to represent her. We allow for endogenously-determined transfers and contingent fees (that is, the lawyer covers all costs and obtains a percentage of any amount won at trial), so that lawyers could buy the client's case and compare that with endogenously-determined contingent fees alone (which represents the current scheme allowed).

Under (pre-contracting) asymmetric information with a contingent fee and a transfer, in equilibrium the higher contingent fee (and transfer from the lawyer to the client) is obtained by the more valuable case, with only the highest-value case resulting in the lawyer buying the entire case (100% contingent fee with a transfer); thus, the value of the case is signaled by the lawyer to the client. In the equilibrium in the "no-transfer" case the first lawyer visited now demands a higher contingent fee for lower-valued cases; again, the case value is signaled. In both settings the client uses an equilibrium strategy that involves seeking a second option a fraction of the time, which induces separation. In both cases the presence of pre-contracting asymmetric information does not affect the client's expected payoff, but it does reduce the lawyer's expected payoff and it can increase moral-hazard-induced inefficiency on the part of the lawyer in the post-contracting investment. We also show that welfare under the no-transfer compensation scheme may increase with an increase in search costs, and that shifting from a no-transfer to an unrestricted-transfer scheme can result in a reduction in expected social efficiency, as the adverse selection effect exacerbates, rather than ameliorates, the moral hazard problem.

1. Introduction

A classic concern in the theory of asymmetrically-informed trade is the purchase of a good by a less-informed buyer from a more-informed seller, especially when the buyer relies upon the expertise of the seller to provide information about the value of the good in the exchange. We consider this problem in the context of a lawsuit: the hiring of a lawyer (the seller of a service) by a client who has been harmed, but who is comparatively ignorant about the value of a potential lawsuit. Complicating the adverse selection issue is that the lawyer will, after contracting based on his superior information about the value of the suit, decide the level of nonverifiable effort to take in pursuing the case at trial. Thus, the value to the buyer and the seller is contingent upon a post-contracting investment choice by the seller, leading to moral hazard. Surprisingly, we find that adverse selection effects can sufficiently exacerbate the moral hazard problem so that, at least in some circumstances, allowing the lawyer to acquire the case from the client (the usual intuition for resolving moral hazard problems, drawn from the principal-agent literature) actually lowers, rather than raises, expected welfare in comparison to prohibiting such arrangements.

This issue is of more than purely theoretical concern. Trade in tort claims is currently prohibited in most jurisdictions, but this is changing. For some years most jurisdictions in the U.S. have allowed lawyers to take a fraction of any winnings in a tort lawsuit (a "contingent fee" which in the U.S. tends to be one-third), based on the lawyer's commitment to cover the costs; historically (reaching back over many centuries of common law) lawyers cannot purchase a case outright by making a payment to the client. In some countries (e.g., Australia, the U.K. and, increasingly, the U.S.), third parties may engage in "litigation funding" wherein the funding party advances money to a plaintiff (or to a law firm) in exchange for a claim on the eventual recovery (these are usually in the form of non-recourse loans, with no need for the recipient to repay should she lose her case). Theoretically, there would appear to be efficiency gains from transferring a claim to an informed expert, as moral hazard problems associated with motivating appropriate effort by the lawyer could be resolved. However, there is also reason for concern if the party purchasing the claim has market power and/or private information regarding its value, both of which seem plausible in regard to tort claims.[1] Thus, the basic policy issue concerns relaxing the constraints on transferring ownership of a legal claim, particularly when the expertise about the value of the claim lies with the acquiring party: there is the very real potential that an informed lawyer with some market power could defraud an uninformed client in such a transaction.

Despite this often-voiced concern, previous analytical models that consider the determination of contingent fees (that is, a percentage of any winnings at trial, with or without any *ex ante* transfers between the client and the lawyer or other third party) assume that the market for legal services is perfectly competitive (see the literature review for specific examples). As a consequence, lawyers try to attract clients by offering compensation structures that will appeal to the clients, rather than trying to fleece the clients. While we certainly believe that competition for clients plays an important role, we provide a model below in which active search by the client is necessary in order to bring this competition about. We use the magnitude of the client's search cost as an index of the extent of lawyers' market power.

We also consider the possibility that lawyers have pre-contracting[2] private information about the value of the client's case. Upon conferring with the client, we assume that the lawyer learns the expected value of the case (the actual realized value will be determined at trial), but this information cannot be conveyed to the client in a credible manner. Rather, the lawyer quotes a compensation demand which consists of a contingent fee and (possibly) a transfer (we will consider both the prevailing situation in which the lawyer cannot make a transfer payment to the client and an unrestricted situation in which the lawyer can make a positive transfer payment to the client or demand a flat fee from the client). The client observes this

[1] Similar considerations can operate in the context of antitrust and intellectual property claims.

[2] Our model involves both private information about the value of the case and moral hazard. We will maintain throughout the assumption that the lawyer's post-contracting effort is unobservable to the client (moral hazard), but we will compare the equilibrium outcomes under private information on the part of the lawyer about the value of the client's case with those that would arise if the lawyer and client were symmetrically-informed about the value of the case. Thus, private information about the case before contracting is referred to specifically as "pre-contracting asymmetric information." In a similar vein, "pre-contracting full information" refers to the condition wherein before contracting both the client and the lawyer know the expected value of the case.

demand, draws any possible inferences from it regarding the expected value of her case, and decides whether to accept the lawyer's demand or to seek a second option by paying the search cost again. If the client seeks a second option, the second lawyer will also learn the expected value of her case (and it is assumed to be the same because it is an attribute of the case and both lawyers are experts in evaluating the case). However, having consulted two lawyers, we assume that the client can induce the lawyers to "bid" for her case. That is, having sought two options, the client can induce the lawyers to compete, but she has to consult both of them (expending the search cost twice) to induce this shift in bargaining power.

We find that, in equilibrium, the contingent fee alone – or in concert with a transfer – can serve as a signal to the client about the expected value of the case. Although the lawyer always prefers a higher contingent fee (and lower transfer payment to the client, when permitted) if this would be accepted, the client responds to less favorable compensation demands with a higher probability of a second search. This restrains the lawyer's temptation to extract surplus from the client to quite a substantial degree. We find that the client's equilibrium payoff is quite simply-expressed and depends on the search cost in a very direct and intuitive way; indeed, the client makes the same payoff as she would make under pre-contracting full information (hereafter: PFI). However, as is often the case in signaling models, the party with the private information – here, the lawyer – makes lower expected profits than he would make under PFI.

When the lawyer can buy part or all of the case from the client, then the equilibrium contingent fee is an <u>increasing</u> function of the expected case value (as is the transfer paid to the client) because lawyers who know that the value of the case is lower distort their compensation demands away from their PFI optima. This is because a lawyer with a high-value case has an incentive to masquerade as one with a low-value case, so a demand suggesting that the case is low-valued is met with a higher probability of rejection by the client (so as to induce separation). Thus, both the client and the lawyer-type with a low-value case engage in behavior that discourages mimicry by the lawyer-type with the high-value case.

On the other hand, when transfers are not possible (e.g., because the client is financially-constrained and the lawyer is prohibited from paying the client), the equilibrium contingent fee quoted by the first lawyer visited is decreasing in the expected case value.[3] Although the equilibrium contingent-fee demand is the same as under PFI (so the low-type lawyer does not distort his compensation demand away from its PFI value), it is now rejected with positive probability in favor of a second search (which leads to competition). This behavior on the part of the client induces separation, and leads to lower expected profits for lawyers.

Since the contingent fee also motivates the lawyer's subsequent effort in the case, this has implications for how efficiently the case is ultimately pursued (where the measure of efficiency here involves only the joint payoff of the client and her lawyer). With no transfers, a lawyer who knows the case is of low value reveals this through choosing a higher contingent fee than if the case were of high value; it is also higher than the fee the client would prefer. Due to the presence of pre-contracting asymmetric information (hereafter: PAI), client search occurs with positive probability in equilibrium, leading to a "bidding down" of the contingent fee. In this case, PAI results in lower lawyer effort (on average). In contrast, when transfers (from lawyer to client) are also allowed, then PAI results in downward-distorted contingent fees and lower lawyer effort than would occur under PFI. Search for a second option in this setting, however, results in an outcome wherein the case is sold outright and thus efficient effort is taken by the lawyer in equilibrium. Therefore, the two alternative contract forms generate substantially different pricing of legal services and potentially different results with respect to amelioration of moral hazard on the part of the lawyer.

We find that, regardless of whether the value of the client's case is common knowledge or private information for the lawyer, and regardless of whether transfers are allowed, the client's equilibrium payoff is lower when lawyers have more market power (that is, when the client's cost of seeking a second option is higher). The effect of an increase in the client's search cost on overall welfare depends on whether transfers are allowed (but, for the most part, not on whether the value of the case is common knowledge or private information for the lawyer). When transfers are allowed, welfare is always decreasing in the level of search

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[3] This is consistent with recent empirical evidence in class action settlements; see Eisenberg and Miller (2010).

costs, but when transfers are not allowed, then an increase in search costs can increase overall welfare, at least when the search cost is sufficiently small. The latter, seemingly perverse, finding is due to the fact that higher search costs lead to higher contingent fees which lead to more efficient conduct of the case at trial. We further ask whether welfare is always improved by allowing transfers. While this is clearly true when the value of the case is common knowledge, we show by example that when the lawyer has private information about the value of the case, then allowing transfers can lower *ex ante* expected welfare.

Plan of the Paper

In Section 2 we review related literature, including the previous work on search that forms the basis of our model and previous work on the determination of the equilibrium compensation structure for lawyers. Section 3 provides notation and describes the continuation game in which a lawyer who has contracted for a case chooses his effort level at trial. Section 4 provides the analysis (first under PFI and then under PAI) for the case wherein lawyers may demand a combination of a contingent fee and a transfer. Section 5 conducts the corresponding analysis for the case wherein lawyers may only be compensated via a contingent fee (essentially, the prevailing permissible compensation scheme). Section 6 provides a discussion of two welfare effects: (1) the effect on welfare of changes in the search costs; and (2) the effect on welfare of changing from the no-transfer case to one wherein unrestricted transfers are allowed, thereby allowing lawyers to buy a client's case . Section 7 provides a discussion of the results and possible extensions. An Appendix provides details of the analysis that is discussed in the text; a separate Technical Appendix[4] provides: additional discussion of the continuation game following the client's search for a second option; the application of an equilibrium refinement to select the least-cost separating equilibrium; and some additional results for the model wherein no transfers are permitted for the case of a continuum of types.

2. Related Literature

Our model involves search, bargaining, and agency problems, in an environment of PAI. It therefore

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[4] Available at http://www.vanderbilt.edu/econ/faculty/Daughety/DR-SearchBargainingandAgencyTechApp.pdf

has antecedents in many separate strands of the literature. Space constraints prevent a thorough literature review, but we will attempt to highlight those papers that seem most closely-related. First, our model of the client-lawyer bargaining process involves history-dependent search, in which bargaining power switches endogenously as a consequence of the searching agent's behavior. This concept was pioneered by Daughety (1993) and was applied to the problem of a consumer searching for the lowest price at which to acquire an item when multiple firms have private information about their common (constant) marginal cost of production.[5] The potential for search constrains the ability of the first firm to profit at the consumer's expense, even when the consumer does not search a second time. In particular, the model involves a widespread inability to commit: the consumer cannot commit to search a specific number of times (she must decide on the spot whether or not to search again, after drawing any possible inferences from the first firm's price quote), nor can the firm commit to a price; it is free to revise its price quote to undercut any rival bidder for the consumer's sale. We maintain this inability to commit in our model of lawyers being induced to bid for cases or for the more limited "right to represent" a client.

Second, Macey and Miller (1991) argue that auctions should be used to select the attorney for large-scale small-value class actions, with the best alternative (assuming a competitive market) being to sell the entire case to the highest bidder; Shukaitis (1987) makes a similar argument for personal injury claims. Macey and Miller also discuss the merits of lawyers bidding, in terms of contingent fees alone, to obtain the right to represent a client.[6] Third, some of the previous related analytical literature has focused on the determination of the contingent fee, assuming no transfers, under PFI. One standard result is that competition by lawyers for clients will not lead to extremely low contingent fees since clients recognize that the

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[5] This search model also appears in Daughety and Reinganum (1991, 1992), which endogenize the use of retail policies such as the probability of a stock-out and the notion of recall (i.e., durable price quotes), respectively.

[6] For example, in *In re Oracle Securities Litigation*, Judge Vaughn R. Walker allocated the role of lead counsel based on bids that specified qualifications and a contingent fee structure. In *In re Auction Houses Antitrust Litigation*, Judge Lewis A. Kaplan allocated the role of lead counsel based on bids that specified qualifications and an amount (contingent on recovery) that would go directly to the class members, with the excess recovery over and above that amount being split between the attorneys (25%) and the class (75%).

contingent fee incentivizes the lawyer's effort when effort is non-contractible[7] (see, e.g., Hay 1996 and 1997; see also Santore and Viard, 2001, who argue that constraints on lawyers making transfers to clients act to preserve lawyers' rents). Using a specific functional form, Hay (1996) finds that the competitively-determined contingent fee is a decreasing function of the anticipated award.

Fourth, two previous papers consider both a contingent fee and a transfer between a plaintiff and her lawyer, when one party has private information about the value of the case.[8] Dana and Spier (1993) assume that lawyers compete for clients by offering contracts prior to the lawyers' receipt of private information about the value of the case. They find that a contract consisting of a contingent fee and a transfer can induce the lawyer to make the jointly-optimal decision about whether to drop the case. They also characterize the optimal contingent fee when the transfer is constrained to be zero. Rubinfeld and Scotchmer (1993) consider a competitive screening model wherein a client is assumed to be better-informed than lawyers about the expected award. Uninformed lawyers offer a menu of contracts to the informed client. They find that the equilibrium contingent fee is 1 (that is, the lawyer purchases the entire case) when the expected award is low. However, in order to sort the client types, a client who claims to have a high-value case cannot receive the same favorable treatment; rather, the contingent fee for high-value cases is (typically) less than 1.

Our model differs from all of the aforementioned models of the fee structure by departing from the assumption of perfect competition on the part of the lawyers. We allow bargaining power to shift endogenously between the lawyer and the client as a consequence of client search. Unlike Dana and Spier (1993), in our model the plaintiff's lawyer has private information about the value of the case when he makes a compensation demand, resulting in the potential for information transmission. Also, in our model it is not

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[7] The judge addressed this concern (see *In re Oracle*, 136 F.R.D. 639, at 641) in awarding the role of lead counsel. McKee, Santore, and Shelton (2007) examine an experimental market for lawyers' services and find that client-subjects reject contingent fee bids that are "too low" and that equilibrium bids are quite close to their predicted values. They also find that lawyer-subjects invest higher effort when the contingent fee is higher (as predicted by the model).

[8] Fong and Xu (2011) consider the compensation structure for defendant's lawyers, finding support for the generally-observed use of flat fees for such representation.

the pursue/drop decision that is of interest but rather the lawyer's subsequent choice of effort given the compensation structure. Our model differs from Rubinfeld and Scotchmer (1993) in that we assume it is the lawyer (rather than the client) who has private information about the value of the case and we provide a signaling (rather than a screening) model.[9] The use of a transfer is crucial in a screening model since all lawyer types prefer higher contingent fees so the contingent fee alone cannot sort them. In our model, the contingent fee alone can signal the expected value of the case, because of the client's endogenous search decision.[10] This search decision can serve as the second "instrument" in the absence of a transfer payment, since a higher contingent-fee demand results in a higher probability of a second search. It is therefore interesting to observe that, when transfers are also permitted, both the contingent fee component and the transfer component differ for the high- and low-value cases. Moreover, the likelihood of a second search is also different, since the lawyer's demand associated with the high-value case is accepted for sure while the one associated with the low-value case is followed by a positive probability of a second search. Thus, the client provides incentives to deter mimicry by the lawyer with a high-value case by searching with a positive probability following the demand associated with a low-value case, while the lawyer with a low-value case provides incentives by specifying a contingent fee less than 1. This is less attractive for a lawyer with a high-value case to mimic (as compared to a contingent fee of 1), and allows the client to engage in a second search with a lower probability than would otherwise be required.

Fifth, the lawyer's opinion about the case value is a credence good (see Dulleck and Kerschbamer, 2006, for a recent survey) since the client cannot observe the expected value of her case directly (either before

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[9] Our results are the opposite of theirs when both a contingent fee and a transfer are possible: it is the high-value case that is purchased in full. This difference in results is due to the alternative allocation of private information, not due to the screening versus signaling game form.

[10] Rubinfeld and Scotchmer (1993) also consider a screening model in which lawyers have private information about their abilities. Although client search is discussed, only extreme versions are considered. When search costs are zero, the client offers a single contract that is unacceptable to a low-quality lawyer, and searches until a (high-quality) lawyer accepts (Cotton and Santore, 2010, conduct an experimental test of this model and find that clients do sort lawyers as predicted). When search costs are prohibitive, the client offers a menu of contracts that sorts lawyer types.

or after trial), nor can she observe the lawyer's effort; thus she cannot verify even *ex post* whether the lawyer's implicit claim about the expected value, or his effort, were appropriate. Models of credence goods typically assume two possible levels of a problem and two possible "treatments." We briefly mention a few of these contributions that seem most closely-related; however, to the best of our knowledge, none of these employ all of the features of our model (although some of these features are present in some of the models): costly search, bargaining under PAI (with bargaining power determined endogenously), and contracting with moral hazard using contingent fees and (potentially) transfers.

Emons (2000) provides a model in which a client may have a high or a low likelihood of success at trial. Additional effort by a lawyer will convert a low-type case into a high-type case; effort is observable, but only the lawyer knows whether or not effort is needed. Emons finds conditions such that contingent fees cannot induce the lawyer to improve the low-type case, while hourly fees can induce lawyers to exert effort efficiently.[11] Fong (2005) provides a model wherein a monopoly provider commits to a pair of prices, one for a minor treatment and one for a serious treatment. When approached by a client, the provider learns the client's problem and recommends a treatment. In equilibrium, the client always accepts the recommendation of minor treatment and rejects the recommendation of serious treatment with a probability that deters the provider from recommending it fraudulently. Wolinsky (1993, 1995) models the search for second options as a means of disciplining experts, who commit to prices before observing the severity of the client's problem. He characterizes equilibria[12] in which experts fraudulently recommend the serious treatment with positive probability and the client searches with positive probability after the first "serious" recommendation. Firms are competitive in Wolinsky (1993), and Wolinsky (1995) is a sequential screening model since uninformed

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[11] Polinsky and Rubinfeld (2003) propose a decentralized scheme with a zero-profit "administrator" coordinating the demand and supply of legal services so as to achieve efficient effort choice by lawyers.

[12] Wolinsky's (1993) main focus is another equilibrium in which some experts choose to specialize in the minor treatment and others maintain the ability to provide either treatment. By first visiting an expert in the minor problem and then – only if declined service – visiting a provider who can treat the serious problem, the consumer can learn the nature of her problem. However, there is some inefficiency due to the fact that some consumers search twice.

clients make offers to informed experts. Pesendorfer and Wolinsky (2003) provide a model wherein a client visits experts sequentially; an expert quotes a two-price contract for his service (one price for diagnosis and another for treatment). Post-contracting, the expert can exert nonverifiable effort (at a cost) in order to learn the correct diagnosis. In equilibrium, the treatment price contains a "quality-guaranteeing" premium that is sufficient to induce some (but insufficient) effort on the part of the expert.

Our model differs in many ways from each of these credence goods models (e.g., in terms of the timing of moves and the information structure), but it differs especially in that our model features: an intermediate level of market power, which changes endogenously because the client can bring the lawyers together to bid for her case; a lack of commitment on the part of all agents; and a post-contracting subgame wherein the lawyer chooses unobservable effort based on the contingent fee.

Sixth, there is previous work on contracting wherein an informed principal offers a contract to an uninformed agent, after which the uninformed agent makes a nonverifiable effort choice. Martimort and Sand-Zantman (2006) examine the choice of a local municipality regarding the extent of privatization of a public utility, while Martimort, Poudou, and Sand-Zantman (2010) consider the (possibly partial) sale of an innovation to a developer. Our paper also combines moral hazard and pre-contracting private information, but in our model the same agent offers the contract and subsequently makes the nonverifiable effort choice.

There is also a related literature that involves the use of two instruments to signal one dimension of private information. Milgrom and Roberts (1986), Lutz (1989), and Linnemer (2002) examine a monopolist's use of price and either advertising or warranties to reveal product quality. Inderst (2002) considers (for concreteness) a single worker with private information about her ability who approaches potential employers in sequence, and makes a contract offer (e.g., a level of effort and a transfer). If her offer is rejected, the worker can pay a search cost and contact another potential employer. Our model differs in a number of ways; for instance, in our model the uninformed client is the searching party; equilibrium necessarily involves randomization when there is private information; the client can bring two lawyers into competition for her case; and the lawyer takes an unverifiable effort decision post-contracting.

Bagwell and Ramey (1991) and Fluet and Emons (2009) examine the use of one signaling instrument wielded by two parties with common private information.[13] In Bagwell and Ramey's model, two incumbent firms (simultaneously) post prices to signal their common unit cost to a potential entrant; they find an equilibrium in which both firms employ their full-information prices. An important aspect of their model is that the potential entrant can punish both firms by entering at out-of-equilibrium price pairs. Emons and Fluet provide a model of a trial in which both a plaintiff and a defendant can exaggerate evidence; when they move simultaneously, there is (costly) exaggeration but when they move sequentially, there is an equilibrium with no exaggeration. In their model the second mover can retaliate against exaggeration by the first mover. In our model, the client must ultimately choose one of the two lawyers to represent her and thus she cannot punish both of them simultaneously. Moreover, the second lawyer's ability to offer a quote is contingent on the client's decision to search again, which is influenced by the first lawyer's quote. In our model the presence of private information about the expected value of the case always reduces efficiency in equilibrium.

3. Model Setup

A harmed client has decided to sue for damages. Let A denote the expected award at trial for the case,[14] where $A \in \{\underline{A}, \overline{A}\}$, with $0 < \underline{A} < \overline{A} < \infty$. Let $H \in (0, 1)$ denote the probability that the expected case value is "high," that is, $H \equiv \Pr\{A = \overline{A}\}$.[15] In the subsequent sections, we will first analyze the relevant problem under PFI regarding A, meaning that A is common knowledge to both the client and all lawyers that the client visits. We will then consider the case wherein the lawyer has private information about the value

[13] Morgan and Krishna (2001) provide a model wherein two experts sequentially provide advice to a decision-maker, but theirs is a "cheap-talk" model, rather than a signaling model.

[14] In the continuation game, the lawyer who contracts with the client chooses trial effort based on the expected award; any realized award (which is observable) cannot reveal the lawyer's effort, thereby allowing for moral hazard.

[15] The PFI analysis for both compensation schemes, and the PAI analysis for the case of a contingent fee only, can be done using a continuum of types; see the Technical Appendix for details.

of A. All other attributes of the model will be common knowledge between the client and the lawyer(s), though the effort of any lawyer who ends up taking the case will not be verifiable. Formally, our analysis under PAI will be of an adverse selection problem with a moral hazard problem as the continuation game.

When a client visits a lawyer, the client incurs a cost $s > 0$, which represents the cost of locating a qualified lawyer (e.g., one with expertise in the relevant area of law), foregoing other uses of the client's time, and documenting and expressing the details of the case (which might impose a disutility on the client as well as a monetary expense); moreover, this cost might also reflect a "consultation fee" that is demanded by the lawyer for him to spend his time listening to the case.[16] This search cost is an important friction, providing the lawyer with some degree of market (or hold-up) power;[17] the higher the search cost the less willing the client will be to seek a second option, and thus the greater the market power of the first lawyer visited. The search cost (expended for each new lawyer that the client visits) only applies to visiting a lawyer for the first time: returning to a previously-visited lawyer is costless.[18]

Should a lawyer take the case, his effort at trial is denoted as $x \geq 0$ and his likelihood of winning at trial (given effort level x) is denoted as $p(x)$; we do not consider the possibility of settlement bargaining in the model. We make the following assumptions about the twice continuously differentiable function $p(x)$.

Assumption 1. $p'(x) > 0$ and $p''(x) < 0$ for $x \geq 0$; $p(0) = 0$, $\lim_{x\to\infty} p(x) = 1$. Moreover, assume that $\lim_{x\to 0} p'(x) = \infty$ and $\lim_{x\to\infty} p'(x) = 0$.

This assumption means that the probability of winning at trial is increasing (at a decreasing rate) in effort,

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[16] In general we would assume that, since lawyers in this model are homogeneous, the consultation fee is the same across all lawyers, reflecting competition among lawyers for clients to seek them and thus it is something that lawyers would use to cover the cost of their time spent in the consultation process, independent of whether they take the case or not; therefore this revenue is a wash from the perspective of the lawyer, as it just covers costs.

[17] A possible solution to the hold-up problem would be for lawyers to pay clients to come to them. However, this would present an arbitrage opportunity to individuals who have not been harmed (and who have negligible true search costs, since they have no disutility associated with documenting or discussing a non-existent harm). Thus, this cannot be an equilibrium strategy for a lawyer to employ.

[18] The search cost at the second lawyer might be lower, as the client might become more efficient in expressing the details of the case. The model does rely on there being a positive cost of the second search, but s can be different for first and second searches without affecting the results; the necessary modifications should be obvious.

and at zero effort this probability is zero. The portions of the assumption that address limits of the function or its derivative simply guarantee that the function acts like a probability ($p(x) < 1$ for all finite values of x) and that it will always be optimal to put in some effort, but that optimal effort will be finite in level.[19]

All qualified lawyers are homogeneous in terms of talent and costs of operation; let $w > 0$ be a lawyer's cost of a unit of effort expended, so that the lawyer's effort costs are wx. Finally, after hearing the details of a case, a lawyer announces a compensation pair (α, F) that he demands for taking the case, where α is the contingent fee (the fraction of the award from trial obtained by the lawyer if the lawyer wins) and F is a transfer between the lawyer and the client. We assume that $0 \leq \alpha \leq 1$ and that F can be positive, zero, or negative. Thus, for example, a demand (1, F) with F positive would be a demand by the lawyer to buy the case from the client at price F; a demand (.5, F) with F negative would be a demand to represent the client wherein the client pays $|F|$ and the lawyer receives $|F|$ as a transfer payment as well as receiving half of any award that is won at trial; a demand of (.333, 0) would be the demand that the lawyer receives one-third of the award and no flat fee is paid or received by the lawyer.

The Effort-Level Continuation Game and the Overall Game

We first describe the effort-level continuation game which is common to all the analyses to come. Assume a lawyer and a client have agreed to a contract that specifies a contingent fee and a transfer (which might be zero); assume that the lawyer's effort x is not contractible. For any given value of A and any demand (α, F), let $\Pi^L(\alpha, A)$ denote the lawyer's anticipated payoff from conducting the trial (ignoring the transfer F). After agreeing to a contract, the plaintiff's lawyer chooses x to maximize $\alpha Ap(x) - wx$; given the assumptions made on p(x), this analysis is analogous to a standard problem in the classical theory of the firm. Under Assumption 1, there is a unique maximizer, denoted $x^L(\alpha, A)$, at which $\alpha Ap'(x) - w = 0$ and $\alpha Ap''(x) < 0$. As long as $\alpha > 0$, optimal effort $x^L(\alpha, A) > 0$; however, should $\alpha = 0$, then $x^L(0, A) = 0$. Let $p^L(\alpha, A) \equiv p(x^L(\alpha, A))$ and let $p^L_1(\alpha, A) \equiv p'(x^L(\alpha, A))x^L_1$ be the partial derivative of p^L with respect to α. Similarly, let

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[19] In what follows, we will compute examples using three different functional forms for p(x). These functions do not satisfy all of the conditions in Assumption 1, but one can use parameter restrictions to ensure interiority of effort.

$p_2^L(\alpha, A) \equiv p'(x^L(\alpha, A))x_2^L$ be the partial derivative of p^L with respect to A. It is straightforward to see that p_1^L, p_2^L, x_1^L, and x_2^L are all positive for $\alpha > 0$. Thus, $\Pi^L(\alpha, A) \equiv \alpha A p^L(\alpha, A) - wx^L(\alpha, A)$; under the maintained assumptions, $\Pi^L(\alpha, A)$, Π_1^L, Π_2^L, and Π_{12}^L are all strictly positive for all $\alpha > 0$.

Let $\Pi^C(\alpha, A) = (1 - \alpha)Ap^L(\alpha, A)$ be the client's payoff from trial when the lawyer chooses his effort in the previously-described continuation game based on his demand (α, F) with expected award value A. Notice that $\Pi^C(0, A) = 0 = \Pi^C(1, A)$; the first equality follows from the fact that the lawyer puts in no effort if $\alpha = 0$ while the client gets no share of the award if $\alpha = 1$. It is worth summarizing some assumed features of the client's reduced-form payoff function, $\Pi^C(\alpha, A)$, before proceeding further. The following assumption ensures that there is a unique interior contingent fee that is most-preferred by the client.[20]

Assumption 2. $\Pi^C(\alpha, A)$ is increasing, and then decreasing, in α for every A. Moreover, for each value of A, assume that: (1) $\Pi^C(\alpha, A)$ is twice differentiable and (2) $\Pi_{11}^C < 0$ at the peak.

Thus, there exists a unique value of $\alpha \in (0, 1)$, denoted $\alpha^C(A)$, that maximizes the client's (partial) payoff $\Pi^C(\alpha, A)$. It is defined by the first-order condition:

$$\Pi_1^C(\alpha, A) = -Ap^L(\alpha, A) + (1 - \alpha)Ap_1^L(\alpha, A) = 0.$$

The only source of conflict between the client and the lawyer concerning the setting of α would occur in the range of $\alpha \geq \alpha^C(A)$, since if $\alpha < \alpha^C(A)$, both parties would find it mutually beneficial to increase the value of α: the lawyer always would desire a higher value of α and the client knows that a value of $\alpha < \alpha^C(A)$ will elicit too little effort on the part of the lawyer.[21] Differentiating $\Pi_1^C(\alpha, A)$ and collecting terms provides the result that $d\alpha^C(A)/dA = -\Pi_{12}^C/\Pi_{11}^C$, where both expressions on the right-hand-side are evaluated at $(\alpha^C(A), A)$. Since $\Pi_{11}^C(\alpha^C(A), A) < 0$, then $\mathrm{sgn}\{d\alpha^C(A)/dA\} = \mathrm{sgn}\{\Pi_{12}^C(\alpha^C(A), A)\}$. We make the following assumption.

Assumption 3. $\Pi_{12}^C(\alpha, A) < 0$ for $\alpha > \alpha^C(A)$, and $\Pi_{12}^C(\alpha, A) \leq 0$ for $\alpha = \alpha^C(A)$.

We have made this assumption because we are unable to prove this property for $\Pi_{12}^C(\alpha, A)$ for general $p(\bullet)$

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[20] In sequential-move games, where the early-chosen strategy affects payoffs both directly and indirectly through its effect on subsequently-chosen strategies of other players, it is often necessary to impose more regularity assumptions on payoff functions than would be required in simultaneous-move games.

[21] A similar point is made by, for example, Hay (1996) and Santore and Viard (2001).

functions (see footnote 20). However, we have considered three fairly classic cases of p(•): (1) $p(x) = \lambda x^\theta$, where $0 < \theta < 1$ and $\lambda > 0$; (2) $p(x) = x/(x+1)$; and (3) $p(x) = 1 - \exp(-\lambda x)$, where $\lambda > 0$. In all three cases, $\Pi^C(\alpha, A)$ satisfies Assumptions 2 and 3.[22] Thus, under Assumption 3, $d\alpha^C(A)/dA \leq 0$. Notice that since the lawyer's incentives to work on the case are strengthened by an increase in either α or A, then Assumption 3 implies that as A increases, the client would prefer to reduce (or leave unchanged) the contingent fee α; thus (at the client's optimum) the lawyer will get a lower share of the higher award A.

Finally, we note that the client's payoff (ignoring search costs) is $\Pi^C(\alpha, A) + F$ and the lawyer's overall payoff is $\Pi^L(\alpha, A) - F$. Two important properties of the combined payoff function, which we will use later, are: (1) the combined payoff $\Pi^C(\alpha, A) + \Pi^L(\alpha, A)$ is maximized at $\alpha = 1$; and (2) moreover, $\Pi^L_1(1, A) + \Pi^C_1(1, A) = 0$ (see the Appendix for a proof).

Sequence of Moves in the Overall Game

We now specify the overall game to proceed as follows:

(1) The client, C, visits lawyer 1 (L1), to discuss the case, at a cost of s; L1 learns A.
(2) L1 makes a demand of (α_1, F_1).
(3) If C accepts L1's demand, then they contract at this demand and the game moves to the effort subgame discussed earlier.
(4) If C rejects L1's demand, then C expends a search cost s in visiting and discussing the case with lawyer 2 (L2); L2 learns A and (α_1, F_1).
(5) L2 makes a demand of (α_2, F_2).
(6) Having visited two lawyers, C may now choose either demand or costlessly auction the right of representation to L1 and L2 using a sealed-bid format, with the winner making the equilibrium demand denoted (α^*, F^*). C chooses the best bid (based on her beliefs) and selects each lawyer with equal probability should they bid the same demand; this is followed by the effort subgame discussed earlier.

In this game, the lawyers cannot pre-commit to their compensation demands in order to avoid bidding for the right to represent the client, while the client cannot pre-commit to her search policy. Thus, the game involves the endogenously-chosen possibility of the transfer of bargaining power from the lawyers to the client if the

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[22] The second condition in Assumption 3 holds with equality in the case of the probability function (1), and with strict inequality in the cases of probability functions (2) and (3). The conditions in Assumption 1 are not all necessary. Each of the aforementioned functional-form examples violates one or more inessential aspects of Assumption 1 without invalidating their use.

client (initially the less-powerful player) is willing to incur the added search cost of consulting a second lawyer. This allows us to incorporate different levels of market power on the part of lawyers in the analysis. Finally, if the auction were not costless then the second lawyer visited would have some (residual) market power, since the client would need to pay the auction cost if she initiated an auction. For simplicity we have assumed that the cost of conducting such an auction is negligible.

In the sequel we consider the preceding game under PFI (A is known by clients and lawyers) and under PAI (A is private information known only by the lawyers). Throughout we maintain the assumption that C can prove to L2 that she has visited another lawyer previously, and she can document the demand made by L1; thus, C cannot mislead an L1 into thinking he is an L2 (because he can demand proof, which she cannot provide if he really is L1). The client does not have an incentive to mislead an L2 into thinking that he is an L1, since she does not expect the lawyers to have different information about her case.

4. Equilibrium Analysis when F is Unconstrained

In this section, arbitrary transfers are allowed; thus, demands by lawyers to represent a client are of the form (α, F). We start by considering the full-information game wherein the client also knows the value of A (the expected value of the case at trial) and wants to contract with a lawyer so as to maximize her (the client's) expected return from the contract. We then extend this analysis to incorporate private information on the part of the lawyers about the value of the client's case.

4.1 PFI Equilibrium when F is Unconstrained

We will solve the game backwards to ensure subgame perfection. In step (6) of the game, the client has expended a second search cost and obtained a second option. Since she can now conduct an auction costlessly, she can obtain a payoff of $\Pi^C(\alpha^*, A) + F^*$, where $(\alpha^*, F^*) = (1, \Pi^L(1, A))$. This holds since (in the auction) both lawyers would choose to bid the maximum amount to the client, which is obtained by first maximizing the profit from the case (i.e., setting $\alpha^* = 1$), and then offering the entire amount to the client (that is, setting $\Pi^L(1, A) - F^* = 0$). If the auction is held, then each lawyer bids the full profit from the case and obtains the right to the case with probability one-half; this is the familiar result from principal-agent theory (when both parties are risk neutral and there is moral hazard) that the principal should sell the firm to the agent, even though (as discussed earlier) the client in our analysis is not a principal in the sense that she cannot commit to a contract *ex ante* to the bargaining/search process. Alternatively, in step (5), L2 could simply make the demand $(1, \Pi^L(1, A))$, which the client would be willing to accept. This demand leaves L2 with no profit, as does the auction, so there is no difference in the equilibrium payoffs to any player between these two continuation games following two searches.

Thus, if the client were to reject L1's demand in step (4), and to expend s and get a second option, she would obtain a payoff of $\Pi^C(1, A) + F^* - s = \Pi^L(1, A) - s$. If she were to accept L1's demand of (α_1, F_1) in step (3), the client would obtain a payoff of $\Pi^C(\alpha_1, A) + F_1$. Therefore, upon a visit from the client in step (2), L1 optimally quotes a compensation demand (α_1, F_1) such that the client is just willing to accept it rather than visit L2. There are multiple such demands, all of which satisfy the following equation:

$$\Pi^C(\alpha_1, A) + F_1 = \Pi^L(1, A) - s. \tag{1}$$

L1 chooses (α_1, F_1) to maximize $\Pi^L(\alpha_1, A) - F_1$ subject to equation (1). Solving equation (1) for F_1 implies that L1 chooses α_1 to maximize $\Pi^L(\alpha_1, A) + \Pi^C(\alpha_1, A) - \Pi^L(1, A) + s$. Only the first two terms depend on α_1, and the maximum is obtained at $\alpha_1 = 1$. Thus, the solution is $(\alpha_1, F_1) = (1, \Pi^L(1, A) - s)$. That is, after paying the cost s to visit L1, the client obtains (ignoring the first search cost) $\Pi^L(1, A) - s$ and L1 obtains s; the client's overall payoff (including the cost of the first search) is $\Pi^L(1, A) - 2s$. We make the following assumption to ensure that the client enters the market for legal services even when her case has value, $\underline{A}$.

Assumption 4. $\Pi^L(1, \underline{A}) - 2s \geq 0$.

We summarize the equilibrium outcome when F is unconstrained and A is common knowledge as follows.

> **Proposition 1.** When A is common knowledge and Assumptions 1 and 4 hold, the equilibrium demand made by the first lawyer visited is $(1, \Pi^L(1, A) - s)$; there is no second search in equilibrium. In equilibrium, the client's overall payoff is $\Pi^L(1, A) - 2s$ and the first lawyer visited obtains s. Finally, the lawyer who obtains the case exerts the efficient level of effort.

4.2 PAI Equilibrium when F is Unconstrained

We now consider the problem when the lawyer is better informed about the expected value of the case than is the client. In particular, we assume that when the client visits a lawyer and describes her case, the lawyer learns (receives a private signal of) the case's expected value A. The client knows only the prior distribution of A; recall that $H = \Pr\{A = \overline{A}\}$.[23] When the lawyer demands (α, F) to represent the client, the client will draw an inference about A from the demand (and this will also be based on any prior history of demands). Because we focus on a separating equilibrium, we assume that the beliefs associate a single value of A with any given demand (α, F).[24]

Again, we solve the problem "backwards," but this time we will be looking for a perfect Bayesian equilibrium due to the lawyers' pre-contracting private information. Should the client conduct an auction, it is clear that an optimal decision rule is to simply accept the highest lump-sum payment bid by the lawyers. This will induce the lawyers to set $\alpha = 1$ to maximize the expected profit from the case, and then to bid this amount away in Bertrand fashion: the equilibrium bid is $F^* = \Pi^L(1, A)$.

Next, we specify the client's beliefs after having visited two lawyers and received two demands, in order to determine when C should conduct an auction. In what follows we briefly describe these beliefs; for a more detailed discussion, see the Technical Appendix. Suppose that L1 made a demand of (α_1, F_1); then if C visits L2, she arrives with beliefs, denoted as $B_1(\alpha_1, F_1)$. It will be useful to define the following curves: $u(B_1(\alpha_1, F_1)) = \{(\alpha_2, F_2) \mid F_2 = \Pi^L(1, B_1(\alpha_1, F_1)) - \Pi^C(\alpha_2, B_1(\alpha_1, F_1))\}$, for $B_1(\alpha_1, F_1) \in \{\underline{A}, \overline{A}\}$. The curve $u(B_1(\alpha_1, F_1))$ is the locus of pairs (α_2, F_2) that make C indifferent between accepting (α_2, F_2) and conducting the auction under the belief that the case has expected value $B_1(\alpha_1, F_1)$; the indifference curves $u(\underline{A})$ and $u(\overline{A})$

[23] We will also briefly report results for a three-type analysis which relies upon the earlier power-function model of the probability of a win at trial; this should provide some further intuition.

[24] Standard refinements, such as the one we will use below (D1), typically select the Pareto optimal separating equilibrium when there are multiple separating (and possibly pooling) equilibria; see Cho and Kreps (1987).

are illustrated in Figure 1 below as dashed lines.

Let $B_2(\alpha_2, F_2 \,|\, B_1(\alpha_1, F_1))$ denote C's posterior belief, after having arrived at L2 with beliefs $B_1(\alpha_1, F_1)$ and having received the demand (α_2, F_2) from L2. We posit that:

$B_2(\alpha_2, F_2 \,|\, \underline{A}) = \underline{A}$ for $(\alpha_2, F_2) \in u(\underline{A})$; for all other (α_2, F_2), $B_2(\alpha_2, F_2 \,|\, \underline{A}) \in \{\underline{A}, \overline{A}\}$.

$B_2(\alpha_2, F_2 \,|\, \overline{A}) = \overline{A}$ for (α_2, F_2) between $u(\underline{A})$ and $u(\overline{A})$, <u>inclusive of these boundaries</u>; for all other (α_2, F_2), $B_2(\alpha_2, F_2 \,|\, \overline{A}) \in \{\underline{A}, \overline{A}\}$.[25]

The implications of these beliefs are as follows. If C approaches L2 with the belief that $B_1(\alpha_1, F_1) = \underline{A}$ and if L2 makes a demand along the curve $u(\underline{A})$, then C continues to believe that the expected case value is $\underline{A}$; we say that C's beliefs are "confirmed" by such a demand. For all other demands (α_2, F_2), C may believe that the expected value of the case is either $\underline{A}$ or $\overline{A}$. That is, C's beliefs may be flexible in the sense that she may revise them upward upon observing L2's (unexpected) demand.

On the other hand, if C approaches L2 with the belief that $B_1(\alpha_1, F_1) = \overline{A}$ and if L2 makes a demand that is <u>either</u> along the curve $u(\underline{A})$, along the curve $u(\overline{A})$, or within the area bounded by these two curves, then C continues to believe that the expected case value is $\overline{A}$; that is, C will rationally hold <u>skeptical</u> beliefs about demands on the part of L2 that are meant to persuade her that the expected value of her case is actually low when she currently believes it is high. This is rational because C knows that lawyers would like the client to believe that her case has a low expected value, and since an L2 of type $\overline{A}$ benefits more than does an L2 of type $\underline{A}$ from a downward revision in C's beliefs (for further detail, see the Technical Appendix). In sum, C's beliefs are not flexible in the sense that she does not revise them downward upon receiving a demand from L2 suggesting a low value after having received a demand from L1 suggesting a high value.

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[25] More precisely, $B_2(\alpha_2, F_2 \,|\, \overline{A}) = \overline{A}$ for $(\alpha_2, F_2) \in \text{epi}(u(\underline{A})) \cap \text{hypo}(u(\overline{A}))$; for all other (α_2, F_2), $B_2(\alpha_2, F_2 \,|\, \overline{A}) \in \{\underline{A}, \overline{A}\}$, where for any function g, epi(g) is the set of points on or above the function g while hypo(g) is the set of points on or below the function g.

We can now summarize equilibrium behavior by C and L2 in the continuation game (again, see the Technical Appendix for more details). When C approaches L2 with the belief that $B_1(\alpha_1, F_1) = \underline{A}$, an optimal strategy for L2 (regardless of whether L2 observed $\underline{A}$ or $\overline{A}$) is to confirm C's belief by demanding $(\alpha_2, F_2) = (1, \Pi^L(1, \underline{A}))$. C accepts this demand and obtains a payoff of $\Pi^L(1, \underline{A})$; L2 makes profits of zero if $A = \underline{A}$ and profits of $\Pi^L(1, \overline{A}) - \Pi^L(1, \underline{A}) > 0$ if $A = \overline{A}$. When C approaches L2 with the belief that $B_1(\alpha_1, F_1) = \overline{A}$ and L2 has observed $\overline{A}$, then an optimal strategy for L2 is to confirm C's belief by demanding $(\alpha_2, F_2) = (1, \Pi^L(1, \overline{A}))$. C accepts this demand and obtains a payoff of $\Pi^L(1, \overline{A})$; L2 makes profits of zero. Finally, when C approaches L2 with the belief that $B_1(\alpha_1, F_1) = \overline{A}$ but L2 has observed $\underline{A}$, then an optimal strategy for L2 is to provoke an auction (since any demand that C would accept would yield negative profits for L2). C will obtain the payoff $\Pi^L(1, \underline{A})$; L2 makes profits of zero.

Now consider the interaction between C and L1. Let $B_1(\alpha_1,F_1) \in \{\underline{A}, \overline{A}\}$ denote the client's belief if the first lawyer visited demands (α_1, F_1); such a demand would yield a perceived payoff to the client (ignoring her initial search cost) of $\Pi^C(\alpha_1, B_1(\alpha_1, F_1)) + F_1$. Alternatively (as argued above), the client expects that she will ultimately obtain a payoff of $\Pi^L(1, B_1(\alpha_1, F_1))$ if she expends a second search cost s and visits a second lawyer. She will be indifferent between these alternatives if:

$$\Pi^C(\alpha_1, B_1(\alpha_1, F_1)) + F_1 = \Pi^L(1, B_1(\alpha_1, F_1)) - s. \qquad (2)$$

It will be useful to define the following curves: $U(A) = \{(\alpha_1, F_1) \mid F_1 = \Pi^L(1, A) - s - \Pi^C(\alpha_1, A)\}$, for $A \in \{\underline{A}, \overline{A}\}$. The curve U(A) is the locus of pairs (α_1, F_1) that make C indifferent between accepting (α_1, F_1) and searching again under the belief that the case has expected value A; the curves $U(\underline{A})$ and $U(\overline{A})$ are illustrated in Figure 1 below as solid lines; they are simply the curves $u(\underline{A})$ and $u(\overline{A})$ shifted down by the amount of the search cost, s. Let $\varphi(\alpha, A) \equiv \Pi^L(1, A) - s - \Pi^C(\alpha, A)$, so that $(\alpha, \varphi(\alpha, A)) \in U(A)$. The expression $\varphi(\alpha, A)$ provides the transfer payment that must accompany a contingent fee of α in order to render C indifferent between accepting L1's demand and searching again, when she believes the expected value of the case is A.

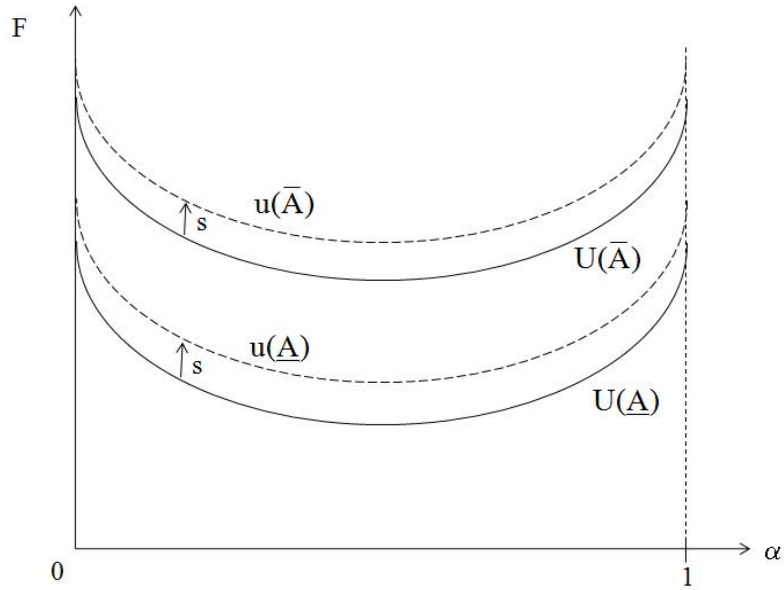

Figure 1: Examples of Client Indifference Curves

There are two paired sets of indifference curves displayed in Figure 1: $u(\bar{A})$ and $u(\underline{A})$ being one pair and $U(\bar{A})$ and $U(\underline{A})$ being the other pair, where u(A) is U(A) shifted upward by the search cost s. While each pair of indifference curves are illustrated as being convex, symmetric, and parallel shifts of one another, this is not a necessary property. However, the same F-value occurs when $\alpha = 0$ and when $\alpha = 1$, and the function first decreases, reaches a minimum at $\alpha^C(A)$, and then increases thereafter. Moreover, we have drawn the indifference curves as if they do not cross. The following assumption is a sufficient condition for the paired curves to not cross (e.g., for $U(\underline{A}) \cap U(\bar{A}) = \varnothing$); it is easily verified to hold for the three specific p(x) functions introduced in subsection 4.1.

Assumption 5: $\varphi(\alpha, A)$ is increasing in A for all $\alpha \in [0, 1]$. Equivalently, $\Pi^L(1, A) - \Pi^C(\alpha, A)$ is increasing in A for all $\alpha \in [0, 1]$.

The economic intuition behind this assumption is as follows. For any value of A, $\Pi^L(1, A)$ is the value of the maximum joint (PFI) payoff to the lawyer and client, since the transfer F nets out and the resulting joint payoff, $\Pi^L(\alpha, A) + \Pi^C(\alpha, A)$, is maximized when $\alpha = 1$. In general, then, $\Pi^L(1, A) - \Pi^C(\alpha, A) > 0$ for all α. It is also clear that this difference is increasing when α is either close to zero or close to one (since $\Pi^C(\alpha, A)$

and $\Pi_2^C(\alpha, A)$ are close to zero there); Assumption 5 asserts that this difference is increasing in A for intermediate values of α as well.

We can now specify beliefs that support a separating equilibrium in the game between L1 and C. Along the curve $U(\underline{A})$, C believes that $A = \underline{A}$; that is, $B_1(\alpha, \varphi(\alpha, \underline{A})) = \underline{A}$ for all $\alpha \in [0, 1]$. Similarly, along the curve $U(\bar{A})$, C believes that $A = \bar{A}$; that is, $B_1(\alpha, \varphi(\alpha, \bar{A})) = \bar{A}$ for all $\alpha \in [0, 1]$. This leaves C indifferent between accepting such a demand from L1 and visiting L2. Since type $\bar{A}$ would prefer to be taken to be $\underline{A}$, C is skeptical about demands (α, F) between the $U(\bar{A})$ and $U(\underline{A})$ curves, assigning them the belief $B_1(\alpha, F) = \bar{A}$. Finally, the client may hold arbitrary beliefs for demands strictly above $U(\bar{A})$ or strictly below $U(\underline{A})$.

Notice that, given these beliefs, C is indifferent between accepting a demand on $U(\bar{A})$ from L1 and visiting L2, whereas she will accept with certainty a demand that lies above $U(\bar{A})$ (regardless of her beliefs). She is also indifferent between accepting a demand on $U(\underline{A})$ from L1 and visiting L2, whereas she will reject with certainty a demand that lies below $U(\underline{A})$ (regardless of her beliefs). Finally, she will reject with certainty any demand from L1 that lies strictly between $U(\underline{A})$ and $U(\bar{A})$ in favor of visiting L2.

In a separating equilibrium, the L1 types must prefer to choose different demands; that is, $(\alpha_1^*(\underline{A}), F_1^*(\underline{A})) \neq (\alpha_1^*(\bar{A}), F_1^*(\bar{A}))$, meaning that at least one component must be different. The beliefs must also be consistent; that is, $B_1(\alpha_1^*(\underline{A}), F_1^*(\underline{A})) = \underline{A}$ and $B_1(\alpha_1^*(\bar{A}), F_1^*(\bar{A})) = \bar{A}$. The different types of L1 will be induced to choose different demands in part by the likelihood with which C accepts the various demands.

First consider demands on the curve $U(\bar{A})$. Although C is indifferent between accepting such a demand from L1 and visiting L2 (given her belief that such a demand comes from a lawyer of type $\bar{A}$), we argue that C should accept such demands in equilibrium. This is because C can certainly do no better than to accept such a demand (and if her beliefs were incorrect, then Assumption 5 implies that she would be strictly better off accepting such a demand rather than searching again). Moreover, even if C were to reject such a demand with positive probability, L1 could increase the transfer F_1 infinitesimally and guarantee acceptance. Thus, L1 can achieve the payoff associated with certain acceptance of any demand on $U(\bar{A})$.

Next consider demands on $U(\underline{A})$. Although C is indifferent between accepting such a demand from L1 and visiting L2 (given her belief that such a demand comes from a lawyer of type $\underline{A}$), she may not be able to accept such demands for sure in a separating equilibrium, for this could induce the lawyer of type $\bar{A}$ to mimic type $\underline{A}$. Let $r(\alpha, F)$ denote the probability with which C rejects a demand by L1 of (α, F) along $U(\underline{A})$.

Finally, we argue that demands on the curve $U(\bar{A})$ or the curve $U(\underline{A})$ are the only ones that could occur in a separating equilibrium; any (profitable) demand above $U(\bar{A})$ is dominated by one that is on $U(\bar{A})$ (e.g., one with the same contingent fee but a lower transfer payment), and any demand between $U(\bar{A})$ and $U(\underline{A})$ or below $U(\underline{A})$ is rejected for sure, which L1 expects will result in his receiving a payoff of 0.

Formally, the incentive compatibility conditions, denoted as $IC(\bar{A})$ and $IC(\underline{A})$, require that each type of lawyer is at least as well off by making a demand along its associated U-curve, rather than the best choice it can make along the other type's curve (thereby inducing an alternative belief by the client):

$$IC(\bar{A}): \quad \max_{(\alpha, F) \in U(\bar{A})} \Pi^L(\alpha, \bar{A}) - F \geq (1 - r(\alpha, F))(\Pi^L(\alpha, \bar{A}) - F) \qquad \forall (\alpha, F) \in U(\underline{A});$$

$$IC(\underline{A}): \quad \max_{(\alpha, F) \in U(\underline{A})} (1 - r(\alpha, F))(\Pi^L(\alpha, \underline{A}) - F) \geq \Pi^L(\alpha, \underline{A}) - F \qquad \forall (\alpha, F) \in U(\bar{A}).$$

The left-hand-side of $IC(\bar{A})$ reduces to finding the value of α that (after substituting in for $\varphi(\alpha, \bar{A})$) maximizes $\Pi^L(\alpha, \bar{A}) - \Pi^L(1, \bar{A}) + s + \Pi^C(\alpha, \bar{A})$. This maximum occurs at $\bar{\alpha}^* = 1$, so that the high type demands $(\bar{\alpha}^*, \varphi(\bar{\alpha}^*, \bar{A})) = (1, \Pi^L(1, \bar{A}) - s)$, yielding a profit to L1 of s (the PFI payoff to an L1 of type $\bar{A}$). Thus, $IC(\bar{A})$ simplifies to:

$$s \geq (1 - r(\alpha, \varphi(\alpha, \underline{A})))(\Pi^L(\alpha, \bar{A}) - \varphi(\alpha, \underline{A})) \quad \forall \alpha \in [0, 1].$$

That is, in order to keep the weak type ($\bar{A}$) from mimicking the strong type ($\underline{A}$), C must reject demands on the curve $U(\underline{A})$ with sufficient frequency $(r(\alpha, \varphi(\alpha, \underline{A})))$ so as to make mimicry unprofitable for the weak type. Notice that not all α-values on $U(\underline{A})$ require a positive probability of rejection, but this is required for $\alpha = 1$ (the weak type's optimal contingent fee).

In a similar manner, $IC(\underline{A})$ can be re-expressed as:

$$\max_{\alpha} (1 - r(\alpha, \varphi(\alpha, \underline{A})))(\Pi^{L}(\alpha, \underline{A}) - \Pi^{L}(1, \underline{A}) + s + \Pi^{C}(\alpha, \underline{A}))$$

$$\geq \Pi^{L}(\alpha, \underline{A}) - \Pi^{L}(1, \bar{A}) + s + \Pi^{C}(\alpha, \bar{A}) \quad \forall \alpha \in [0, 1].$$

In the Appendix we show that, in a separating equilibrium, $IC(\underline{A})$ is slack as long as s is not too large (we denote the upper bound on s as $\hat{s}$). Thus, the economic intuition is that when search costs are not too large the strong type does not have an incentive to mimic the weak type.

Combining these two results provides a set of possible rejection functions for the client, each of which (with the beliefs as specified earlier) supports a separating equilibrium. Figure 2 illustrates this set of functions, expressed in terms of the probability of acceptance, 1 - r. Note that any selection (that is, a function selected so that its graph is entirely in the region of interest) will satisfy the IC constraints, but the function represented by the upper boundary of the set will provide the one that yields separation with the least

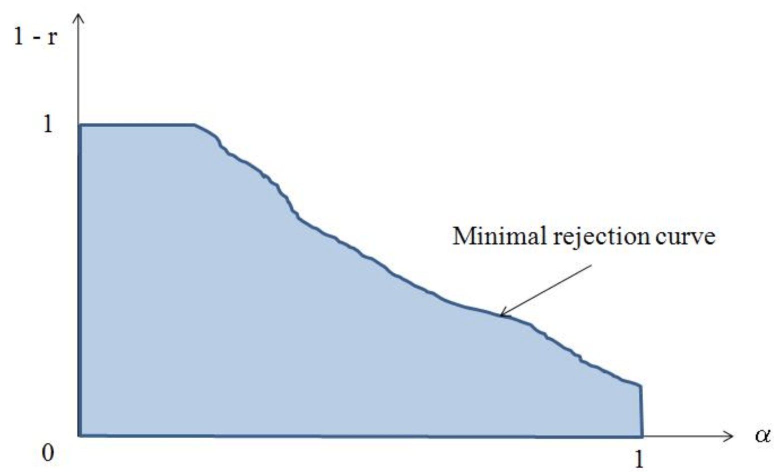

Figure 2: Alternative Equilibrium Rejection Probabilities

amount of rejection (search).[26] This selected rejection function is most-preferred by the $\underline{A}$-type lawyer; both the client and the $\bar{A}$-type lawyer are indifferent, making this selection the unique Pareto optimal rejection function.[27] It is found by taking IC($\bar{A}$) to be an equality which, upon solving, yields:

$$(1 - r(\alpha, \varphi(\alpha, \underline{A})) = s/(\Pi^L(\alpha, \bar{A}) - \varphi(\alpha, \underline{A})) = s/(\Pi^L(\alpha, \bar{A}) - \Pi^L(1, \underline{A}) + s + \Pi^C(\alpha, \underline{A})). \quad (3)$$

Using this on the left-hand-side of IC($\underline{A}$) and solving the optimization problem thereby provides the $\underline{A}$-type's demand ($\underline{\alpha}^*$, $\varphi(\underline{\alpha}^*, \underline{A})$). Thus, type $\underline{A}$ can be viewed as choosing α so as to solve:

$$\text{maximize}_\alpha\ s[\Pi^L(\alpha, \underline{A}) - \Pi^L(1, \underline{A}) + s + \Pi^C(\alpha, \underline{A})]/[\Pi^L(\alpha, \bar{A}) - \Pi^L(1, \underline{A}) + s + \Pi^C(\alpha, \underline{A})]. \quad (4)$$

As shown in the Appendix, $\underline{\alpha}^*$ is less than 1: the $\underline{A}$-type lawyer demands a contingent fee less than 1 and offers an up-front payment of $\varphi(\underline{\alpha}^*, \underline{A}) = \Pi^L(1, \underline{A}) - \Pi^C(\underline{\alpha}^*, \underline{A}) - s < \Pi^L(1, \underline{A}) - s = \varphi(1, \underline{A})$. That is, the $\underline{A}$-type lawyer demands a compensation package (α_1, F_1) both of whose elements are less than what obtains in the PFI equilibrium. We note that (as can be seen in Figure 2) it is possible that $\underline{\alpha}^*$ is such that $1 - r = 1$.

To make more headway, let us consider the power-function probability model[28] discussed in Section 3; that is, $p(x) = \lambda x^\theta$, where $0 < \theta < 1$ and $\lambda > 0$. This function requires a further parametric restriction in order to guarantee that $p^L(\alpha, A) \leq 1$ for all α and A: $\bar{A} \leq (w/\theta)(\lambda^{-1/\theta})$. Then the lawyer's continuation payoff (that is, his payoff assuming the subgame-perfect choice of effort) is $\Pi^L(\alpha, A) = (w(1 - \theta)/\theta)(\alpha A\lambda\theta/w)^{1/(1 - \theta)}$ while the client's payoff is $\Pi^C(\alpha, A) = (1 - \alpha)A\lambda(\alpha A\lambda\theta/w)^{\theta/(1 - \theta)}$. It can be shown (see the Appendix) that $\underline{\alpha}^* = (1 - s/[(1 - \theta)z\underline{A}^{1/(1 - \theta)}])^{(1 - \theta)/\theta}$, where $z = \lambda^{1/(1 - \theta)}(\theta/w)^{\theta/(1 - \theta)}$, and that $\underline{\alpha}^*$ is increasing in $\underline{A}$ and decreasing in w. Thus, if the least valuable case increases in value, then the first lawyer visited will demand a larger share,

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[26] It cannot be an equilibrium for $\underline{\alpha}^*$ to be in the interior of the horizontal segment in Figure 2, since then it could be increased with no change in the client's response (or the $\bar{A}$-type lawyer's demand). This would increase $\underline{A}$'s payoff, contradicting the hypothesized optimality of $\underline{\alpha}^*$.

[27] The equilibrium strategies using this selected rejection function provide the unique separating equilibrium outcome that survives refinement using D1 (see Cho and Kreps, 1987). This is discussed in the Technical Appendix.

[28] This example can be extended to more (discrete) types following the same procedure (that is, assuming that higher types have an incentive to mimic lower types, but lower types do not have an incentive to mimic higher types). In the equilibrium, the contingent fee is monotonically increasing in A, reaching $\alpha^* = 1$ only for the highest type, $\bar{A}$.

while if (instead) the cost of a lawyer's time increases, he will demand a smaller share. As will be discussed in more detail below for the general two-type case, an increase in s reduces $\underline{\alpha}^*$.

Proposition 2 summarizes the perfect Bayesian equilibrium outcome for the case of unrestricted transfer payments; out-of-equilibrium beliefs that support this equilibrium,[29] and the associated response of C to out-of-equilibrium demands by L1, can be found in the discussion above.

Proposition 2. Under Assumptions 1-5 (and $s < \hat{s}$), a separating equilibrium which employs the Pareto-optimal rejection function is as follows:

a) If $A = \bar{A}$, then the first lawyer visited demands $(\alpha_1, F_1) = (1, \Pi^L(1, \bar{A}) - s)$ and the client accepts with certainty. In equilibrium C's overall payoff is $\Pi^L(1, \bar{A}) - 2s$ while L1's payoff is s, and L2's payoff is zero. Since L1 buys the case from C, L1's effort is efficient.

b) If $A = \underline{A}$, then L1 demands $(\alpha_1, F_1) = (\underline{\alpha}^*, \varphi(\underline{\alpha}^*, \underline{A}))$ with $\underline{\alpha}^* < 1$ and $\varphi(\underline{\alpha}^*, \underline{A})$ as specified earlier, and C rejects this demand with probability $r(\underline{\alpha}^*, \varphi(\underline{\alpha}^*, \underline{A}))$ as given in equation (3). If the demand is rejected, then L2 is visited (at an additional search cost s), resulting in the equilibrium demand $(1, \Pi^L(1, \underline{A}))$, which C accepts. In equilibrium, C's overall payoff is $\Pi^L(1, \underline{A}) - 2s$, L1's payoff is $(1 - r(\underline{\alpha}^*, \varphi(\underline{\alpha}^*, \underline{A})))(\Pi^L(\underline{\alpha}^*, \underline{A}) + \Pi^C(\underline{\alpha}^*, \underline{A}) - \Pi^L(1, \underline{A}) + s)$, and L2's payoff is again zero. Since L1 does not buy the entire case, he exerts too little effort.

The following comparative statics result holds if $\underline{\alpha}^*$ is to the right of the kink discussed above; that is, if $r(\underline{\alpha}^*, \varphi(\underline{\alpha}^*, \underline{A})) < 1$ on the boundary of the set shown in Figure 2. It is straightforward to show that $d\underline{\alpha}^*/ds < 0$: an increase in the client's search cost means that the equilibrium contingent fee for an $\underline{A}$-type lawyer falls. This reflects both a direct and an indirect effect. The direct effect is that an increase in s makes a second search less attractive to C, but a lower likelihood of search increases the incentive for an $\bar{A}$-type lawyer to mimic the $\underline{A}$-type. The indirect effect is that the $\underline{A}$-type lawyer lowers his contingent fee, reducing the incentive for mimicry, thereby allowing the client to reduce her rejection rate for the resulting $\underline{A}$-type demand; that is, $dr(\underline{\alpha}^*, \varphi(\underline{\alpha}^*, \underline{A}))/ds < 0$.

5. Equilibrium Analysis when F = 0

In this subsection, we consider demands that specify a contingent fee, but transfer payments are

[29] The out-of-equilibrium beliefs that satisfy the D1 refinement are actually harsher than those described in the text; the D1 beliefs require that out-of-equilibrium demands along the curve $U(\underline{A})$ be assigned to type $\bar{A}$. The weaker beliefs we employ in the text are sufficient to support the D1 equilibrium, and facilitate the exposition.

restricted to be zero. This is representative of the status quo in that lawyers are currently not allowed to make transfer payments to clients and, for the most part, clients suing for damages are wealth-constrained. We first consider the case wherein the client and any lawyer visited have common knowledge about the expected value of the case; then we modify the model to reflect private information on the part of the lawyers about the expected value of the case.

5.1 PFI Equilibrium when F = 0

When the client and any lawyer she visits have common knowledge about A, L1 will quote a contingent fee that may depend on the expected award, A, and which we denote by $\alpha^L(A)$. The client can either accept this offer or leave and visit L2, expending a one-time cost of s. As indicated in step (6) of the overall game, a client who has visited two lawyers can induce them to bid for the client's case. Thus, after visiting two lawyers, the winning bid (should the client initiate an auction) will be the contingent fee that maximizes the client's payoff; that is, $\alpha^C(A)$. Since L2 can anticipate the outcome of the auction (in which he will bid $\alpha^C(A)$ and win with probability 1/2), he will prefer to simply offer $\alpha_2 = \alpha^C(A)$ at step (5) if he expects that the client will accept this demand (and the client would be willing to accept it, since this is the anticipated winning bid in the auction). Thus, there two possible outcomes following the second search, one in which the auction is conducted and one in which C simply accepts L2's demand of $\alpha_2 = \alpha^C(A)$. In the PFI model and in the model wherein transfers are permitted, it doesn't really matter which of these equilibria is chosen. In the model with PAI wherein only contingent fees can be used, it does matter; this is discussed in more detail in the relevant subsection below. For concreteness, we will proceed under the assumption that L2 demands $\alpha_2 = \alpha^C(A)$ and C accepts.

Thus, the client's overall payoff is $\Pi^C(\alpha^C(A), A) - 2s$ if she rejects L1's offer at step (4) and visits L2, and is $\Pi^C(\alpha^L(A), A) - s$ if she accepts L1's offer at step (3). In order to ensure that all types will enter the market for legal services when only contingent fees can be used, we maintain the following assumption (a modification of Assumption 4), which is an implicit restriction on $\underline{A}$ in relation to the search cost s and the parameters of the problem. Note that, since $\Pi^C(\alpha^C(A), A)$ is increasing in A, we need only concern ourselves with the lowest-value case for both cases to be worth the client's choice to seek representation.

Assumption 4'. $\Pi^C(\alpha^C(\underline{A}), \underline{A}) - 2s \geq 0$.

Comparing the client's payoffs from visiting one versus two lawyers implies that, in order to maximize his payoff, L1 should charge the contingent fee $\alpha^L(A)$ such that:

$$\Pi^C(\alpha^L(A), A) = \Pi^C(\alpha^C(A), A) - s. \tag{5}$$

Any $\alpha^L(A)$ yielding a lower client surplus would be rejected (the client would visit a second lawyer and then, along the equilibrium path, she would accept L2's demand of $\alpha^C(A)$), while any demand yielding a higher client surplus would be accepted by C but would result in lower profit for L1. In equilibrium the client, though indifferent, accepts the demand $\alpha^L(A)$ defined implicitly by equation (5).

Since $\Pi^C(\alpha, A)$ is first increasing, and then decreasing, in α and reaches its maximum at $\alpha^C(A)$, equation (5) will have two solutions, one on either side of the function's peak. Since $\Pi^L(\alpha, A)$ is increasing in α, it follows that $\alpha^L(A)$ will be the <u>larger</u> solution to equation (5); thus, if $s > 0$, then $\alpha^L(A) > \alpha^C(A)$ for $A \in \{\underline{A}, \overline{A}\}$. Moreover, since Assumption 4' implies that $\Pi^C(\alpha^C(A), A) - s > 0 = \Pi^C(1, A)$ for $A \in \{\underline{A}, \overline{A}\}$, it follows that $\alpha^L(A) < 1$ for $A \in \{\underline{A}, \overline{A}\}$.

In the Appendix we show that $d\alpha^L(A)/dA < 0$; that is, the equilibrium contingent fee under PFI is a decreasing function of the expected award A. A lawyer who anticipates a higher award is willing (because of the client's credible threat to seek a second option) to represent the client for a <u>lower</u> contingent fee (recall that when F is unconstrained, the contingent fee is <u>higher</u> for higher A). These results are summarized below.

Proposition 3. When A is common knowledge and Assumptions 1 - 3 and 4' hold, L1 will demand the contingent fee rate $\alpha^L(A)$ to represent the client; moreover, $\alpha^L(A) \in (\alpha^C(A), 1)$, where $\alpha^L(A)$ satisfies equation (5). C will accept this demand: there is no second search in equilibrium. Furthermore, $\alpha^L(\underline{A}) > \alpha^L(\overline{A})$. For any given value of A, in equilibrium C's payoff is $\Pi^C(\alpha^L(A), A) - s = \Pi^C(\alpha^C(A), A) - 2s$, while L1's payoff is $\Pi^L(\alpha^L(A), A)$. Finally, since $\alpha^L(A) < 1$, the lawyer exerts an inefficient level of effort.

As an example of the results of the PFI analysis, we reconsider the power-function example wherein

$p(x) = \lambda x^{\theta}$, where $0 < \theta < 1$ and $\lambda > 0$. Recall that the lawyer's continuation payoff (that is, his payoff assuming the subgame-perfect choice of effort) is $\Pi^L(\alpha, A) = (w(1 - \theta)/\theta)(\alpha A\lambda\theta/w)^{1/(1 - \theta)}$ while the client's payoff is $\Pi^C(\alpha, A) = (1- \alpha)A\lambda(\alpha A\lambda\theta/w)^{\theta/(1 - \theta)}$. It is straightforward to show that the client's most-preferred value of α is $\alpha^C(A) = \theta$ for $A \in \{\underline{A}, \overline{A}\}$. Thus, the client always wants the lawyer to have the contingent fee $\alpha = \theta$, independent of the value of A; that is, $d\alpha^C(A)/dA = 0$. If the client obtains two options, then the lawyers will compete for her case. In this event, the equilibrium bid is C's ideal contingent fee; that is, $\alpha^C(A) = \theta$ for $A \in \{\underline{A}, \overline{A}\}$. So C's continuation value after obtaining two options is given by $\Pi^C(\alpha^C(A), A) = \Pi^C(\theta, A)$, and L1 is therefore able to charge $\alpha = \alpha^L(A)$ such that $\Pi^C(\alpha^L(A), A) = \Pi^C(\theta, A) - s$. Although this equation could be solved explicitly for $\alpha^L(A)$, this does not yield much insight. However, we do know that the example satisfies Assumptions 2 and 3, and therefore $\alpha^L(\underline{A}) > \alpha^L(\overline{A})$: in equilibrium, higher-value cases (that is, cases with higher values of A) are contracted at lower contingent fees.

5.2 PAI Equilibrium when F = 0

We now modify the model to reflect private information on the part of the lawyers about the expected case value, A, and we characterize a perfect Bayesian equilibrium. Consider the continuation game at step (6) when C decides to conduct an auction. Let $B_2(\alpha_2 \mid B_1(\alpha_1))$ denote C's posterior belief, after having arrived at L2 with beliefs $B_1(\alpha_1)$ and having received the demand α_2 from L2. We assume that, if at least one of the lawyers makes the demand $\alpha^C(B_2(\alpha_2 \mid B_1(\alpha_1)))$, then the client does not further revise her beliefs; this demand not only "confirms" her beliefs, it is her most-preferred contingent fee, given those beliefs. Under this assumption, it is a Nash equilibrium for both lawyers to bid $\alpha^C(B_2(\alpha_2 \mid B_1(\alpha_1)))$ in the auction, and for C to choose each of them with equal probability. To see why, notice that neither lawyer is tempted to deviate unilaterally from this demand, since this would not change C's beliefs and would only concede the case to the non-deviating lawyer. Since the lawyer can adjust his effort so as to obtain $\Pi^L(\alpha, A) > 0$ for any $\alpha > 0$ (see Assumption 1 and the discussion following), he always prefers a one-half chance of obtaining the case to foregoing the case altogether. Notice that, in the auction, the lawyers bid C's ideal contingent fee based

<u>on her beliefs coming into the auction</u>, regardless of the true expected value of the case.[30]

Next, we specify the client's beliefs, $B_2(\alpha_2 \mid B_1(\alpha_1))$, after having visited two lawyers and received two demands. Suppose that L1 has made a demand of α_1; then, should C visit L2, she will arrive with beliefs of $B_1(\alpha_1) \in \{\underline{A}, \overline{A}\}$. By definition, the demand $\alpha^C(B_1(\alpha_1))$ makes C indifferent between accepting L2's demand and conducting the auction under the belief that the expected value of the case is $B_1(\alpha_1)$. We specify the beliefs $B_2(\alpha_2 \mid B_1(\alpha_1))$ as follows:

$$B_2(\alpha_2 \mid \underline{A}) = \underline{A} \text{ for } \alpha_2 = \alpha^C(\underline{A}); \text{ for all other } \alpha_2,\ B_2(\alpha_2 \mid \underline{A}) \in \{\underline{A}, \overline{A}\}.$$

$$B_2(\alpha_2 \mid \overline{A}) = \overline{A} \text{ for all } \alpha_2 .$$

The implications of these beliefs are as follows. If C approaches L2 with the belief that $B_1(\alpha_1) = \underline{A}$ and if L2 makes the demand $\alpha^C(\underline{A})$, then C continues to believe that the expected case value is $\underline{A}$; C's beliefs are "confirmed" by such a demand. For all other demands α_2, C may believe that the expected value of the case is either $\underline{A}$ or $\overline{A}$. That is, C's beliefs may be flexible in the sense that she may revise them upward upon observing L2's demand.

On the other hand, if C approaches L2 with the belief that $B_1(\alpha_1) = \overline{A}$, then she maintains this skeptical belief regardless of the demand made by L2. Since C knows that L2 would like her to believe that her case has a low expected value (and since an L2 of type $\overline{A}$ benefits more than does an L2 of type $\underline{A}$ from a downward revision in C's beliefs), C will rationally hold skeptical beliefs about demands on the part of L2 that are meant to persuade C that the expected value of her case is actually low, contrary to her current beliefs (this is discussed in further detail in the Technical Appendix).

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[30] This is a very complicated continuation game, and we do not claim to have characterized all possible equilibria; nevertheless, this seems to be a very plausible one (and the one most analogous to the case with F unconstrained) in that it involves quite intense competition on the part of the lawyers, should C conduct an auction. Recall that for the case of $p(x) = \lambda x^\theta$, where $0 < \theta < 1$ and $\lambda > 0$, it turns out that $\alpha^C(A) = \theta$, for $A \in \{\underline{A}, \overline{A}\}$. Thus, in this case C has a very simple decision rule in the auction that is <u>independent of her beliefs</u>: choose the lawyer whose demand is closest to θ (and choose each with equal probability should they make the same demand). This will induce both lawyers to bid $\alpha = \theta$ in the auction and C will choose one of them at random.

We can now summarize equilibrium behavior by C and L2 in the continuation game at step (5) (full details are provided in the Technical Appendix). When C approaches L2 with the belief $B_1(\alpha_1)$, an optimal strategy for L2 (regardless of whether L2 observed $\underline{A}$ or $\overline{A}$) is to confirm C's belief by demanding $\alpha_2 = \alpha^C(B_1(\alpha_1))$; C accepts this demand.[31] She obtains a payoff of $\Pi^C(\alpha^C(B_1(\alpha_1)), \underline{A})$ if the expected value of the case is $\underline{A}$ and a payoff of $\Pi^C(\alpha^C(B_1(\alpha_1)), \overline{A})$ if the expected value of the case is $\overline{A}$.

We now consider the interaction between C and L1, anticipating the continuation equilibrium described above. Given the results from the PFI analysis, L1 has an incentive to make a high contingent fee demand so as to suggest to the client that A is low (even if it is not); if the client were to blindly accept this, then L1 would be able to inflate his payoff over what it would have been in the full-information setting. Thus, the model reflects the policy concern that the expert might mislead the lay person into accepting a poorer deal than she would have been able to strike if she had been fully informed. Of course, in the separating equilibrium the client does not accept the lawyer's demand blindly, and in the separating equilibrium the true expected value A is revealed.

In this scenario, the client visits L1 and discloses the details of her case. Having been offered the contingent fee α_1 by L1 in step (2), the client believes that the expected value of her case is $B_1(\alpha_1)$. If she accepts L1's demand, she expects to receive a payoff of $\Pi^C(\alpha_1, B_1(\alpha_1))$, whereas if she leaves to consult a second lawyer, she expects to pay the search cost s and to receive a payoff of $\Pi^C(\alpha^C(B_1(\alpha_1)), B_1(\alpha_1))$. The client will accept L1's demand if $\Pi^C(\alpha_1, B_1(\alpha_1)) > \Pi^C(\alpha^C(B_1(\alpha_1)), B_1(\alpha_1)) - s$ and reject L1's demand if $\Pi^C(\alpha_1, B_1(\alpha_1)) < \Pi^C(\alpha^C(B_1(\alpha_1)), B_1(\alpha_1)) - s$. She will be indifferent between accepting and rejecting L1's demand if $\Pi^C(\alpha_1, B_1(\alpha_1)) = \Pi^C(\alpha^C(B_1(\alpha_1)), B_1(\alpha_1)) - s$. Randomizing is the means by which she can induce

[31] There are actually two possible types of equilibrium after the client has searched twice, one in which the client conducts the auction and one in which L2 makes a demand that the client accepts. In the text we provide the details of the model assuming the second type of equilibrium. The details of the analysis (for a continuum of types) are provided in a separate Technical Appendix, wherein both types of equilibria (following two searches) are explored. While the client's equilibrium probability of search is somewhat different under these two alternatives, the lawyer's (L1's) separating equilibrium demand function is the same.

L1 to reveal the true expected case value through the demand he chooses.

To preview the form of the equilibrium, L1 will use the PFI demand relationship $\alpha^L(A)$ for $A \in \{\underline{A}, \overline{A}\}$; C will accept the demand $\alpha^L(\overline{A})$ (a relatively low contingent fee) for sure, and she will reject the demand $\alpha^L(\underline{A})$ (a relatively high contingent fee) with a probability that is sufficient to deter mimicry by the L1 of type $\overline{A}$. Thus, in the model with only a contingent fee, both L1 types choose their full-information strategies; all of the burden of deterring mimicry falls on the client.[32]

The beliefs that support this equilibrium are: $B_1(\alpha_1) = \underline{A}$ for all $\alpha_1 \geq \alpha^L(\underline{A})$; otherwise, $B_1(\alpha_1) = \overline{A}$. Notice that C is skeptical about demands $\alpha_1 \in (\alpha^L(\overline{A}), \alpha^L(\underline{A}))$, assigning them to the weak type $\overline{A}$. Optimal behavior on the part of C, given these beliefs, is to reject any demand $\alpha_1 > \alpha^L(\underline{A})$; this is actually optimal regardless of C's beliefs. She will also reject any demand $\alpha_1 \in (\alpha^L(\overline{A}), \alpha^L(\underline{A}))$. Finally, there are demands strictly below $\alpha^C(\overline{A})$ that C would reject because even she believes that this share is too low to appropriately incentivize the lawyer's incentives to exert effort. However, C would accept with certainty any demand $\alpha_1 \in (\alpha^C(\overline{A}), \alpha^L(\overline{A}))$. Finally, C is indifferent between accepting and rejecting a demand of $\alpha^L(\overline{A})$ and a demand of $\alpha^L(\underline{A})$. However, since $\overline{A}$ is the weak type, he must receive his PFI payoff in a separating equilibrium. Thus, C must accept with certainty the demand $\alpha^L(\overline{A})$. Moreover, even if C rejected this demand with positive probability, type $\overline{A}$ could achieve the payoff associated with a certain acceptance of this demand by cutting his demand by an arbitrarily small amount, given that demands in $(\alpha^C(\overline{A})\ \alpha^L(\overline{A}))$ are accepted with certainty.

Thus, there are only two candidate contingent fees, $\alpha^L(\overline{A})$ and $\alpha^L(\underline{A})$, with the former being employed in a separating equilibrium by type $\overline{A}$ and being accepted for sure. It remains to characterize circumstances

[32] Recall that equation (5) has two roots; the larger root is $\alpha^L(A)$,L1's preferred solution under PFI. In the Technical Appendix we show that (under a strict version of Assumption 6 below) a separating equilibrium based on the smaller root does not survive refinement using D1.

under which a separating equilibrium exists, with type $\underline{A}$ demanding $\alpha^L(\underline{A})$; let r denote the probability with which C rejects the demand $\alpha^L(\underline{A})$. The incentive compatibility constraints are much simpler when no transfer payments are allowed.

$$IC(\overline{A}):\ \ \Pi^L(\alpha^L(\overline{A}), \overline{A}) \geq (1 - r)(\Pi^L(\alpha^L(\underline{A}), \overline{A}));$$

$$IC(\underline{A}):\ \ (1 - r)(\Pi^L(\alpha^L(\underline{A}), \underline{A}) \geq \Pi^L(\alpha^L(\overline{A}), \underline{A})).$$

Taken together, these conditions imply that (in terms of the acceptance probability 1 - r):

$$1 - r \in [\Pi^L(\alpha^L(\overline{A}), \underline{A})/\Pi^L(\alpha^L(\underline{A}), \underline{A}), \Pi^L(\alpha^L(\overline{A}), \overline{A})/\Pi^L(\alpha^L(\underline{A}), \overline{A})]. \quad (6)$$

If this interval is non-empty, then the (refined) equilibrium value of r, denoted as r*, is given by the upper endpoint: $r^* = 1 - \Pi^L(\alpha^L(\overline{A}), \overline{A})/\Pi^L(\alpha^L(\underline{A}), \overline{A})$.[33] Assumption 6 provides a sufficient condition for this interval to be non-empty.

Assumption 6. $\Pi^L(\alpha_1, A)/\Pi^L(\alpha_2, A)$ is (at least weakly) increasing in A for all $\alpha_1 < \alpha_2$. Equivalently, the function $\Pi^L(\alpha, A)$ is log submodular.[34]

Again, due to the complexity of the effort-choice continuation game, we cannot prove that Assumption 6 will hold for arbitrary p(x) functions; however, it does hold for our three previously-mentioned examples. The ratio in Assumption 6 is strictly increasing in A for the examples $p(x) = x/(1 + x)$ and $p(x) = 1 - e^{-\lambda x}$, for $\lambda > 0$. This ratio is actually constant in A for the power-function example $p(x) = \lambda x^\theta$, where $0 < \theta < 1$ and $\lambda > 0$, and it is straightforward to show that for this particular example, $r^* = 1 - [\alpha^L(\overline{A})/\alpha^L(\underline{A})]^{1/(1 - \theta)}$.

To summarize, L1's demand function in the PAI setting (with F = 0) is the same as in the corresponding PFI setting; the difference between the two analyses is that in the PAI setting the client employs a mixed strategy to provide incentives for types to separate. This means that, in equilibrium, a client seeks a second option a fraction of the time. Therefore, while the client's payoff is the same as under PFI,

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[33] Using the rejection probability that is just sufficient to deter mimicry reflects the use of the equilibrium refinement D1to select the Pareto optimal separating equilibrium. It can be shown that the skeptical beliefs survive refinement using D1 (uniquely, if the ratio in Assumption 6 is strictly increasing; see the Technical Appendix).

[34] For a discussion of log submodularity, see Topkis (1998, p. 64).

the lawyer's payoff is actually lower. All of this is more formally stated (for the general probability function satisfying Assumption 1) in the following proposition.

Proposition 4. When A is the lawyer's private information and Assumptions 1-3, 4' and 6 hold, then L1demands the contingent fee rate $\alpha^L(A)$ to represent the client; $\alpha^L(A) \in (\alpha^C(A), 1)$, where $\alpha^L(A)$ satisfies equation (5). In equilibrium, C accepts this demand with probability 1 - r* (the upper endpoint in the interval specified in equation (6)); thus, there is a second search with probability r*. The client's overall payoff is the same as under PFI, $\Pi^C(\alpha^C(A), A) - 2s$, for $A \in \{\underline{A}, \overline{A}\}$. For $A = \overline{A}$, L1's payoff is $\Pi^L(\alpha^L(\overline{A}), \overline{A})$ and L2's payoff is zero, whereas for $A = \underline{A}$, L1's payoff is $(1 - r^*)\Pi^L(\alpha^L(\underline{A}), \underline{A})$ and L2's payoff is $r^*\Pi^L(\alpha^C(\underline{A}), \underline{A})$. Thus, the expected payoff to the lawyers is less than was obtained under PFI. The lawyer exerts an inefficient level of effort in the continuation game; L1 exerts $x^L(\alpha^L(A), A)$ in effort, while L2 exerts $x^L(\alpha^C(A), A) < x^L(\alpha^L(A), A)$ in effort, for $A \in \{\underline{A}, \overline{A}\}$. Thus, the lawyer exerts (on average) yet less effort under PAI than under PFI.

Thus, we find that the client is no worse off than under PFI, while the lawyer is worse off due to the need to deal with the distortion introduced by revelation under PAI. In this case, the distortion shows up in the increased use by the client of search, not in the actual demand made. Of course, one important difference is that the distribution of contracts now involves two points for the same expected case value, $\underline{A}$: a fraction (1 - r*) of the contracts will be at a contingent fee of $\alpha^L(\underline{A})$, while the rest will be at $\alpha^C(\underline{A})$.

6. Welfare Implications

There are two aspects of the model that have important effects on welfare, where welfare is the sum of the payoffs for C, L1, and L2. These aspects reflect the presence of (limited) market power on the part of lawyers (captured in the model via the search cost, s) and the presence of asymmetries in information between the lawyers and the client. We consider these in turn, as both aspects produce unexpected results: (1) when F is restricted to be zero then increases in s may <u>improve</u> welfare; and (2) shifting from a no-transfer system to an unrestricted transfer system may <u>reduce</u> welfare. We will see that these results, while seemingly counterintuitive, are quite reasonable.

<u>6.1 The Effect of Changes in the Search Cost on Welfare</u>

In this section we hold the regime (F = 0 or F unrestricted) fixed and ask what happens when the search cost, s, changes. To keep comparisons clear, we let W_j^i denote welfare under i = PFI or i = PAI and under F = 0 or F unrestricted (j = 0 or u, where u means "unrestricted"); thus, for example, social welfare in the F-unrestricted, PFI case would be denoted as W_u^{PFI}. While these welfare measures are a function of A, we suppress this dependence for ease of exposition.

First, consider W_0^{PFI}. Clearly, an increase in s reduces C's payoff in equilibrium, since it is $\Pi^C(\alpha^C(A), A) - 2s$ for a given A (see Proposition 3). However, notice that increasing s increases $\alpha^L(A)$, resulting in greater effort in the trial subgame, reducing the moral hazard problem in the contingent-fee-only scheme. Thus, there is a tradeoff here. Since $W_0^{PFI} = \Pi^L(\alpha^L(A), A) + \Pi^C(\alpha^C(A), A) - 2s$, then it is straightforward to show that $dW_0^{PFI}/ds \gtrless 0$ as:

$$\Pi_1^L(\alpha^L(A), A)(\partial\alpha^L(A)/\partial s) \gtrless 2.$$

Both terms on the left are positive, for the reasons discussed earlier, so the issue is the magnitude of their product. In particular, $\partial\alpha^L(A)/\partial s = - 1/ \Pi_1^C(\alpha^L(A), A)$. As s becomes small, $\Pi_1^C(\alpha^L(A), A)$ becomes arbitrarily close to $\Pi_1^C(\alpha^C(A), A)$, which is zero by the definition of $\alpha^C(A)$, so that $\partial\alpha^L(A)/\partial s$ becomes arbitrarily large. Thus, when s is "small," then $\Pi_1^L(\alpha^L(A), A)(\partial\alpha^L(A)/\partial s) > 2$, while if s is sufficiently large then it can be shown that $\Pi_1^L(\alpha^L(A), A)(\partial\alpha^L(A)/\partial s) < 2$.[35] This means that when s is small, an increase in s <u>improves</u> welfare. This occurs because while C is hurt directly via an increase in s, the increased subgame efficiency from increasing $\alpha^L(A)$ overcomes this social loss and raises the payoffs from the subgame to both C and L1. However, since $\alpha^L(A) < 1$, the benefit via the subgame is diminishing, while the harm to C is linear in s.

Social welfare in the F = 0 case under PAI is the same as under PFI for $A = \overline{A}$; when $A = \underline{A}$ it is:

$$W_0^{PAI} = W_0^{PFI} - r^*[\Pi^L(\alpha^L(\underline{A}), \underline{A}) - \Pi^L(\alpha^C(\underline{A}), \underline{A})].$$

The added complication is that one needs to find the effect of s on the second term above, which includes both the direct effect on the coefficient of r*, as well as the effect on r* itself, through the effect of s on $\alpha^L(\underline{A})$.

[35] Note that the turning point, where the effect shifts from being welfare-enhancing to welfare-diminishing, depends upon the details of the subgame. Thus, whether such a critical s value is ruled out by Assumption 4' (that two searches by C is credible) depends upon the probability model (p(x)) employed. If such a critical value of s does not satisfy Assumption 4', then welfare is always increasing in s for the relevant range of search cost.

Since the coefficient of r* converges to zero as s becomes very small, if r* does not increase too dramatically as s becomes very small, then a qualitative result similar to the full-information result emerges: when s is sufficiently small, an increase in s improves welfare W_0^{PAI}. Although we have been unable to verify this property in general due to the complexity of the dependence of W_0^{PAI} on s when $A = \underline{A}$, this property does hold for the power function version of p(x).

The PFI, F-unrestricted case is very easy. From Proposition 1, $W_u^{PFI} = s + \Pi^L(1, A) - 2s$, so it is immediate that $dW_u^{PFI}/ds < 0$ for all s. This is because, under PFI, the subgame always involves the efficient level of effort, so while lawyer L1 obtains s (L2 is never visited by this C), C's payoff declines at twice the rate that L1's increases. Finally, in the computation of dW_u^{PAI}/ds, the calculations are more tedious than in the PFI case, but the result is the same: $dW_u^{PAI}/ds < 0$. To see this, first observe that when $A = \bar{A}$, as discussed in Proposition 2, welfare is the same as the full-information case. The complication arises in the $\underline{A}$-case, as now search occurs in equilibrium. However, L2's payoff is zero, so the expected social welfare value, W_u^{PAI}, can be written as:

$$W_u^{PAI} = (\Pi^L(1, \underline{A}) - 2s) + \{(1 - r(\underline{\alpha}^*, \varphi(\underline{\alpha}^*, \underline{A})))(\Pi^L(\underline{\alpha}^*, \underline{A}) - \Pi^L(1, \underline{A}) + s + \Pi^C(\underline{\alpha}^*, \underline{A}))\}.$$

Recall that $\underline{\alpha}^*$ was found by maximizing the term in braces with respect to α (see equations (3)-(4)), where $1 - r(\underline{\alpha}^*, \varphi(\underline{\alpha}^*, \underline{A}) = s/[\Pi^L(\underline{\alpha}^*, \bar{A}) - \Pi^L(1, \underline{A}) + s + \Pi^C(\underline{\alpha}^*, \underline{A})]$ also depends directly on s. It is routine to show that while the term in braces is increasing in s, that rate of increase is less than 2, which is the rate at which the first term above decreases: the effect on W_u^{PAI} is preponderantly via the direct loss to C's payoff, so once again $dW_u^{PAI}/ds < 0$ for all s.

6.2 The Effect of Changes in the Compensation Scheme on Welfare

The effect of changing from the no-transfer to the unrestricted-transfer regime, while straightforward for the PFI case, is more complex for the PAI case. Under PFI it is straightforward to show that C prefers the regime with transfers while L1 prefers the regime with contingent fees only. Moreover, overall welfare is higher in the regime with transfers (see the Appendix for the proof of these statements).

When we turn to the PAI case, this comparison is unchanged for the case of $A = \bar{A}$: $W_0^{PAI} < W_u^{PAI}$. However, the comparison when $A = \underline{A}$ is much more complicated, so for this discussion we have numerically analyzed the power-function model from earlier ($p(x) = \lambda x^\theta$), with the following parameter assumptions: (1) $\lambda = w = 1$; (2) $\theta = 0.5$; (3) $\bar{A} = 1.5$; and (4) $\underline{A} = 1$; this implies an upper bound for s (due to Assumption 4')[36] of 0.0625. The numerical results for this example, which are illustrated in Figure 3, show that when s is sufficiently small then the difference in welfare measures, $\Delta^{PAI}(\underline{A}) \equiv W_u^{PAI} - W_0^{PAI}$, is strictly positive, but when s is sufficiently large (but still satisfies the credibility requirement of Assumption 4') then $\Delta^{PAI}(\underline{A}) < 0$. This occurs because as s grows, it becomes more costly for C to search, and C optimally adjusts the rejection probability in both compensation schemes, though in different directions. In the F-unrestricted scheme, the rejection probability falls. To maintain separation, the low-type of L1 must reduce $\underline{\alpha}^*$, leading to reduced subgame efficiency when C does not reject the demand. Both effects work to reduce welfare. On the other hand, in the no-transfer scheme, an increase in s allows L1 to demand a higher contingent fee, leading to

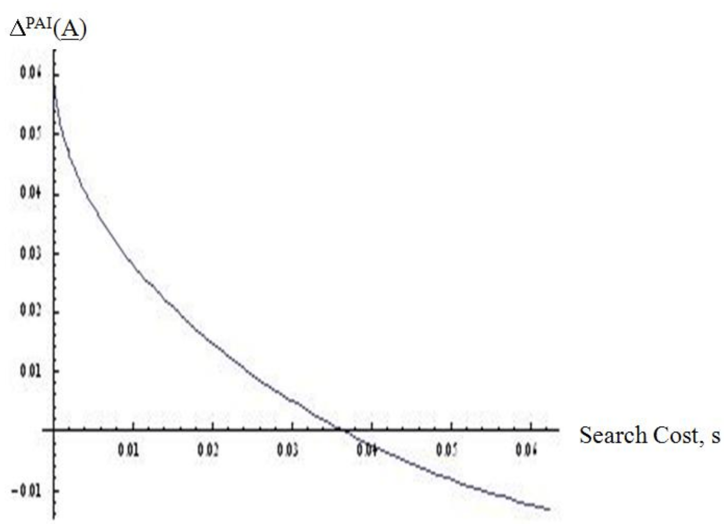

Figure 3: Net Welfare vs. Search Cost

[36] Assumption 4' is employed instead of Assumption 4, since the latter assumption (which was for the unrestricted transfer case) is weaker and we are comparing the two regimes.

greater subgame efficiency when C does not reject the demand (however, to deter mimicry, rejection must occur with higher probability). In this case the two effects work in opposite directions on welfare. As a consequence, W_u^{PAI} falls faster than W_0^{PAI}, and for approximately half the allowed range of s, net welfare from a switch in policy ($\Delta^{PAI}(\underline{A})$) is negative.

Thus, if the initial distribution of types puts enough weight on the low type, $\underline{A}$, and search costs are sufficiently high, then the expected welfare from the no-transfer policy will be greater than that from the unrestricted-transfer policy: the intuition we get from the principal-agent model does not carry over to the correct prediction for a portion of the parameter space when there is adverse selection during the contracting activity as well as moral hazard in the continuation game.

6.3 Summary of Welfare Effects

Proposition 5 summarizes our welfare results discussed above.

Proposition 5.

(1) Under PFI and under PAI, increases in the search cost s are always welfare-reducing when F is unrestricted, but may be welfare-enhancing when F is restricted to be zero. In the no-transfer case, if search costs are high enough, then increases in search costs will be welfare-reducing.

(2) Under PFI, unrestricted transfers are always socially preferred. When the lawyers have private information about the value of the case, then this may not hold: if the prior probability of the low type is sufficiency high, then when search costs are high enough a very simple counter-example shows that there can be greater inefficiency under unrestricted transfers than under restricted transfers.

These results paint an interesting picture. First, under the no-transfer scheme, search costs (while directly harming consumers) may provide an indirect benefit to all parties if they are not too large: they improve the efficiency of the effort-choice subgame. That is, some lawyer market power helps redress the subgame moral hazard problem, and the fact that the search cost is exogenous acts as a device to bring about this reduction in social inefficiency in a manner that is not fully bargained away. Second, the presence of PAI complicates the policy question of shifting to an unrestricted-transfer scheme: it may reduce rather than enhance welfare. The problem here is the need for some of the agents (both C and the low-type L1) to engage in wasteful distortion in order to induce separation.

7. Conclusions and Extensions

Three conclusions/implications can be drawn from the foregoing analysis. First, informational asymmetry appears to be less of a problem for clients than is lawyer market power. It is the cost of search, which reflects market power on the part of the lawyers, that reduces the payoff to the client, not asymmetry of information (as long as search costs are low enough for the client to credibly use the threat of search). In the case of the traditional compensation scheme (no transfers), the lawyer's demands follow the same schedule under PAI and PFI; the inflation of the first lawyer's demand is fully attributable to the search cost. Furthermore, in the traditional setting, we find that reducing search costs may actually reduce welfare, as it reduces the incentives for lawyer effort at trial. On the other hand, when transfers are allowed, then welfare is higher when search costs are reduced.

Second, allowing lawyers to make unrestricted-transfer demands with private information about the value of the case will not result in L1 demanding to buy the case except at the highest possible award $\bar{A}$. We draw this conclusion by observing that initial demands will generally involve an equilibrium value of α which is less than one. This appears to extend to cases involving more (discrete) types; that is, $\alpha = 1$ only for the highest type (this is illustrated in the Appendix for the power-function example). Since for all types except the highest type the client will search with positive probability, such search nets the client the best possible payoff (modulo having to search) of $\Pi^L(1, A)$. Of course, when L1 offers to buy the case, it only occurs for the highest type and involves the maximal transfer to the client of $F = \Pi^L(1, \bar{A}) - s$. This further implies that the claim (often made in the law and economics literature) that allowing lawyers to buy a client's case necessarily will lead to the elimination of moral hazard is incorrect. As shown, the presence of PAI leads to this being (possibly) the comparatively rare outcome as it would only occur for cases that have the highest expected value or cases wherein clients search a second time. More significantly, we found that the interplay of the lawyers' market power and PAI can result (for some levels of the search cost) in lower welfare in the unrestricted-transfer equilibrium than in the corresponding no-transfer equilibrium.

A third pair of implications concerns some issues we have not addressed, but which (at least qualitatively) seem to be reflected in our equilibrium. It is possible that the informational asymmetry is two-sided: perhaps clients know relevant information. In this case, we should expect (as in Rubinfeld and Scotchmer, 1993) that wary lawyers will have less reason to buy the case outright, leading to further downward-pressure on the contingent fee rates, which is qualitatively similar to our current result. It is also possible that lawyers might need the involvement of clients in the trial to come, but that comes automatically in our PAI analysis of the unrestricted-transfer case since, in contrast with the PFI version, α will generally be less than one in the equilibrium, meaning that clients continue to have a stake in the future of the case (unless they search for a second option, in which case they will be bought out). Furthermore, as Shukaitis (1987, page 340) has observed, buyout of a client that reduces her incentive to provide needed future cooperation with the lawyer is probably not as critical as one might initially believe, as this can be dealt with through an appropriate contract, so either way this particular concern seems to fade into the background.

One important extension would be to allow for a third party, the "litigation-funder," as mentioned in the Introduction. Such third-party activity appears to be growing and the presence of litigation-funders has raised concerns with legislators and with practicing attorneys (see Beisner, et. al., 2009, a brief discussion written by three attorneys with a major law firm – Skadden – whose title suggests their perspective: "Selling Lawsuits, Buying Trouble"). There is no reason to expect that litigation funders will have preferences that are consistent with those of either the client or the attorney, and the added conflict of incentives is also likely to influence the equilibrium pricing of legal services as well as the efficiency of the lawyer's effort choice.

Alternatively, one could incorporate a model of the defense lawyer as a strategic agent who will also exert effort at trial, thereby augmenting the model of the continuation game to allow for effort on the part of both competing lawyers. Defense lawyers are unlikely to employ a contingent fee, but whatever the form of their compensation (e.g., per unit of effort), this will affect the plaintiff's lawyer's compensation demand.

A further extension is to allow for settlement bargaining activity as an alternative to trial as part of the continuation game after contracting. Hay (1997) has shown (for F = 0 and under PFI) why contracting can lead to differential contingent fees for settlement versus trial activity by the lawyer. Adding a settlement phase to the continuation game can affect the information revelation process, possibly influencing the contracting problem as well as the incentives for the lawyer in his effort choice.

Finally, it would be valuable to relax our assumption that clients' expected payoffs are sufficiently high that they will always enter the market for legal services and that search will always be a credible threat. Lower search costs, which encourage entry by clients into the market, are associated with lower contingent fees if there is no transfer, but somewhat higher contingent fees if transfers are allowed. When the transfer F is unconstrained the lawyer makes (at most) the amount of the search cost, s, on a case. If transfers are forbidden, then lawyers' profits are not dissipated greatly since the client herself does not want the contingent fee to be too low. In our model lawyers can be better off if either search costs are higher or if transfers are forbidden; indeed, Santore and Viard (2001) make this latter point (in a model with no search costs), noting that allowing transfers from lawyers to clients intensifies competition among lawyers and dissipates profits. However, this does not account for the possibility that higher search costs, or the use of contingent fees only, also reduce the *ex ante* expected value of entering the legal process for clients. It is quite possible that sufficiently high search costs and/or the use of contingent fees only would deter some clients from entering the market for legal services, while these clients would find it profitable to enter this market if they were able to capture more of the value of their case through transfer payments from the lawyers. A full characterization of the results with arbitrary search costs (for which fully-separating equilibria may fail to exist) would be of value to understand the implication of allowing unrestricted (α, F)-pricing of legal services.

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Appendix

This Appendix contains material in support of arguments made in the text.

Proof that α = 1 maximizes joint payoffs and that the derivative of joint profits is zero when α = 1

By definition, $\Pi^L(\alpha, A) + \Pi^C(\alpha, A) = Ap(x^L(\alpha, A)) - wx^L(\alpha, A)$, where $x^L(\alpha, A)$ maximizes $\alpha Ap(x) - wx$. This latter problem is well-defined for all $\alpha \geq 0$, not only for $\alpha \leq 1$, and thus both $x^L(\alpha, A)$ and $\Pi^L(\alpha, A) + \Pi^C(\alpha, A)$ are also well-defined for all $\alpha \geq 0$. Differentiating yields:

$$\Pi^L_1(\alpha, A) + \Pi^C_1(\alpha, A) = [Ap'(x^L(\alpha, A)) - w]x^L_1(\alpha, A).$$

Since $x^L_1(\alpha, A) > 0$, the sign of the left-hand-side is the same as the sign of $[Ap'(x^L(\alpha, A)) - w]$. By definition, $\alpha Ap'(x^L(\alpha, A)) - w = 0$, so $[Ap'(x^L(\alpha, A)) - w] > 0$ for $\alpha < 1$ and $[Ap'(x^L(\alpha, A)) - w] = 0$ for $\alpha = 1$. Finally, $[Ap'(x^L(\alpha, A)) - w] < 0$ for $\alpha > 1$. Thus, $\alpha = 1$ provides an unconstrained maximum of the combined payoffs, at which the first derivative of the combined payoffs is zero.

Proof that IC($\underline{A}$) is slack for sufficiently small search costs

In a separating equilibrium, IC($\underline{A}$) is slack as long as s is not too large. To see this, let $\hat{\alpha}$ maximize $\Pi^L(\alpha, \underline{A}) - \Pi^L(1, \bar{A}) + s + \Pi^C(\alpha, \bar{A})$ for fixed s; this expression is the right-hand-side of IC($\underline{A}$). Notice that $\hat{\alpha} < 1$ since were $\hat{\alpha}$ equal to one we would need to have $\Pi^L_1(1, \underline{A}) + \Pi^C_1(1, \bar{A}) = 0$. However, since $\Pi^C_1(1, \bar{A}) = -\Pi^L_1(1, \bar{A})$ and $\Pi^L_1(1, \underline{A}) - \Pi^L_1(1, \bar{A}) < 0$, the equality cannot hold. Thus, $\hat{\alpha} < 1$; moreover, $\hat{\alpha}$ is independent of s, so let:

$$\hat{s} \equiv \Pi^L(1, \bar{A}) - (\Pi^L(\hat{\alpha}, \underline{A}) + \Pi^C(\hat{\alpha}, \bar{A})).$$

Then the right-hand-side of IC($\underline{A}$) is non-positive for all $s < \hat{s}$. As long as $r(\alpha, \varphi(\alpha, \underline{A}))$ is less than 1, the left-hand-side of IC($\underline{A}$) can always be made to be positive by an appropriate choice of α, so that the incentive constraint IC($\underline{A}$) is always slack. Moreover, from Assumption 5 it is straightforward to show that $d\hat{s}/d\bar{A} > 0$ and that $d\hat{s}/d\underline{A} < 0$, so that an increase in $\bar{A} - \underline{A}$ allows an increase in the upper bound on the allowable values of s such that we are guaranteed that IC($\underline{A}$) is always slack. The assumption that $s < \hat{s}$ is overly strong but expositionally convenient.

Proof that $\underline{\alpha}$ is less than 1 in the two-type case when F is unconstrained*

Let α^k solve the equation $s = \Pi^L(\alpha, \bar{A}) - \Pi^L(1, \underline{A}) + s + \Pi^C(\alpha, \underline{A})$. This defines the value of α at which the "kink" occurs in Figure 2. Let $\underline{\alpha}$ denote the equilibrium contingent fee for $\underline{A}$. We have already noted in the text that $\underline{\alpha}$ cannot be less than α^k. Therefore, $\underline{\alpha}$ maximizes the expression:

$$s(\Pi^L(\alpha, \underline{A}) - \Pi^L(1, \underline{A}) + s + \Pi^C(\alpha, \underline{A}))/(\Pi^L(\alpha, \bar{A}) - \Pi^L(1, \underline{A}) + s + \Pi^C(\alpha, \underline{A})).$$

Let $n(\alpha) \equiv \Pi^L(\alpha, \underline{A}) - \Pi^L(1, \underline{A}) + s + \Pi^C(\alpha, \underline{A})$ and let $\Delta(\alpha) \equiv \Pi^L(\alpha, \bar{A}) - \Pi^L(\alpha, \underline{A})$. Then, equivalently, $\underline{\alpha}$ maximizes $n(\alpha)/[\Delta(\alpha) + n(\alpha)]$. Both $n(\alpha)$ and $\Delta(\alpha)$ are increasing functions on [0, 1] with $n'(1) = 0$ and $n(1) = s$. Differentiating and collecting terms implies that the sign of the first derivative is the same as the sign of the expression $\Delta(\alpha)n'(\alpha) - n(\alpha)\Delta'(\alpha)$. Evaluating this expression at α = 1 yields $-s\Delta'(1) < 0$. Thus, by moving α down below 1, the $\underline{A}$-type of lawyer improves his profit and thus $\underline{\alpha}^* < 1$. We cannot rule out the possibility of a boundary solution at α^k (although there are parameter values that preclude it).

*Comparative statics of $\underline{\alpha}$**

At an interior solution (i.e., $\underline{\alpha}^* > \alpha^k$), $\underline{\alpha}$ will satisfy $\Delta(\underline{\alpha}^*)n'(\underline{\alpha}^*) - n(\underline{\alpha}^*)\Delta'(\underline{\alpha}^*) = 0$ and the associated second-order condition $\Delta(\underline{\alpha}^*)n''(\underline{\alpha}^*) - n(\underline{\alpha}^*)\Delta''(\underline{\alpha}^*) < 0$. The claim that $\underline{\alpha}^*$ falls as s rises follows directly: $d\underline{\alpha}^*/ds = \Delta'(\underline{\alpha}^*)/[\Delta(\underline{\alpha}^*)n''(\underline{\alpha}^*) - n(\underline{\alpha}^*)\Delta''(\underline{\alpha}^*)] < 0$. Finally, the claims that $dr(\underline{\alpha}^*, \varphi(\underline{\alpha}^*, \underline{A}))/ds < 0$, as long as $r(\underline{\alpha}^*, \varphi(\underline{\alpha}^*, \underline{A})) < 1$, and that the $\underline{A}$-type's payoff rises as s increases, both follow from differentiation (recalling that s enters $n(\underline{\alpha}^*)$ directly).

Power-function example for the PAI, (α, F) case for two and three types

Recall that $z \equiv \lambda^{1/(1-\theta)}(\theta/w)^{\theta/(1-\theta)}$. For the power-function example when there are two types, $\Delta'(\alpha) = \Delta(\alpha)/\alpha(1-\theta)$; thus, the function $\Delta(\alpha)n'(\alpha) - n(\alpha)\Delta'(\alpha)$ has the same sign as $\alpha(1-\theta)n'(\alpha) - n(\alpha) = (1-\theta)z\underline{A}^{1/(1-\theta)}(1-\alpha^{(1-\theta)/\theta}) - s$. This expression is positive at α = 0 (under Assumption 4), negative at α = 1, and strictly decreasing. Thus there is a unique solution, $\underline{\alpha}^* = (1 - s/[(1-\theta)z\underline{A}^{1/(1-\theta)}])^{(1-\theta)/\theta}$, which maximizes the payoff of the $\underline{A}$-type lawyer.

Finally, if there were, for example, three possible values of A, $\{\underline{A}, A_m, \overline{A}\}$, with $\underline{A} < A_m < \overline{A}$, then $\overline{\alpha}^* = 1$, $\alpha_m^* = (1 - s/[(1-\theta)zA_m^{1/(1-\theta)}])^{(1-\theta)/\theta}$, and $\underline{\alpha}^* = (1 - s/[(1-\theta)z\underline{A}^{1/(1-\theta)}])^{(1-\theta)/\theta}$. The fraction of the case that the lawyer purchases is increasing in case value, with only the highest-value case being purchased in full.

Proof that $\alpha^L(A)$ is decreasing in A

To see how $\alpha^L(A)$ depends on A, use equation (5) to define $g(\alpha, A) \equiv \Pi^C(\alpha, A) - \Pi^C(\alpha^C(A), A) + s$. Then $g(\alpha^C(A), A) = s > 0$ and $g(\alpha^L(A), A) = 0$. Differentiating this latter expression and collecting terms implies that $d\alpha^L(A)/dA = -g_2/g_1$, where both expressions on the right-hand-side are evaluated at $(\alpha^L(A), A)$. Notice that $g_1(\alpha^L(A), A) = \Pi_1^C(\alpha^L(A), A) < 0$ since $\Pi^C(\alpha, A)$ is decreasing for $\alpha > \alpha^C(A)$. Moreover, $g_2(\alpha^L(A), A) = \Pi_2^C(\alpha^L(A), A) - \Pi_2^C(\alpha^C(A), A)$; this difference has the same sign as $\Pi_{12}^C(\alpha^L(A), A)$ because $\alpha^L(A) > \alpha^C(A)$. Recall from Assumption 3 that $\Pi_{12}^C(\alpha, A) < 0$ for all $\alpha > \alpha^C(A)$. Combining these sign results implies that $d\alpha^L(A)/dA < 0$.

Preferences over regimes under PFI

It is obvious that (using equation (5)), for $A \in \{\underline{A}, \overline{A}\}$:

$$W_0^{PFI} = \Pi^L(\alpha^L(A), A) + \Pi^C(\alpha^C(A), A) - 2s = \Pi^L(\alpha^L(A), A) + \Pi^C(\alpha^L(A), A) - s < W_u^{PFI} = \Pi^L(1, A) - s,$$

since $\alpha^L(A) < 1$, making $\Pi^L(\alpha^L(A), A) + \Pi^C(\alpha^L(A), A)$ always less than $\Pi^L(1, A)$. Thus, society prefers transfers.

C's payoff with transfers is $\Pi^L(1, A) - 2s$, while she receives $\Pi^C(\alpha^C(A), A) - 2s$ when transfers are restricted to be zero. Since $\Pi^L(1, A) > \Pi^C(\alpha^C(A), A)$, C prefers transfers. L1's payoff under transfers is s, while L1's payoff under contingent fees only is $\Pi^L(\alpha^L(A), A)$. Note that:

$$\Pi^L(\alpha^L(A), A) - s > 0 \text{ if and only iff } \Pi^L(\alpha^L(A), A) + \Pi^C(\alpha^C(A), A) - s > \Pi^C(\alpha^C(A), A).$$

However, since $\Pi^C(\alpha^L(A), A) = \Pi^C(\alpha^C(A), A) - s$, then $\Pi^L(\alpha^L(A), A) - s > 0$ if and only if:

$$\Pi^L(\alpha^L(A), A) + \Pi^C(\alpha^L(A), A) > \Pi^C(\alpha^C(A), A).$$

The left-hand-side above is strictly greater that $\Pi^L(\alpha^C(A), A) + \Pi^C(\alpha^C(A), A)$ since combined profits are increasing in α and $\alpha^L(A) > \alpha^C(A)$. Thus, $\Pi^L(\alpha^L(A), A) - s > 0$.