SHOULD COURTS ALWAYS ENFORCE WHAT CONTRACTING PARTIES WRITE?*

Luca Anderlini
Georgetown University

Leonardo Felli
London School of Economics and Political Science

Andrew Postlewaite
University of Pennsylvania

This paper replaces TE/2003/464

Contents

Discussion Paper No. TE/06/510
October 2006
The Suntory-Toyota International Centres for
Economics and Related Disciplines
London School of Economics and Political Science
Houghton Street
London WC2A 2AE
Tel.: 020-7955 6674

---

* We thank Lucien Bebchuk, Oliver Hart, Elisabetta Iossa, John Moore, Stephen Morris, Steven Shavell, Alan Schwartz and seminar participants at ESSET 2003 (Gerzensee), Birkbeck, CESifo (Munich), Ente Einaudi (Rome), Harvard, LSE and Yale for stimulating discussions and comments. Postlewaite gratefully acknowledges financial support from the National Science Foundation.

Abstract

We find an economic rationale for the common sense answer to the question in our title — courts should not always enforce what the contracting parties write.

We describe and analyze a contractual environment that allows a role for an active court. An active court can improve on the outcome that the parties would achieve without it. The institutional role of the court is to maximize the parties' welfare under a veil of ignorance.

We study a buyer-seller multiple-widget model with risk-neutral agents, asymmetric information and ex-ante investments. The court must decide when to uphold a contract and when to void it.

The parties know their private information at the time of contracting, and this drives a wedge between ex-ante and interim-efficient contracts. In particular, if the court enforces all contracts, pooling obtains in equilibrium. By voiding some contracts the court is able to induce them to separate, and hence improve ex-ante welfare. In some cases, an ambiguous court that voids and upholds both with positive probability may be able to increase welfare even further.

JEL Classification: C79, D74, D89, K40, L14.

Keywords: Optimal Courts, Informational Externalities, Ex-Ante Welfare.

Address for correspondence: Andrew Postlewaite, Department of Economics, University of Pennsylvania, 3718 Locust Walk, Philadelphia, PA 19104-6297.
E-mail: apostlew@econ.upenn.edu.

1. Introduction

It is self-evident that courts are active players in contractual relationships between economic agents. They routinely intervene in contractual disputes, excusing performance called for in the contract because of intervening events. Yet, in most of modern economic theory courts are treated (often not even modeled, but left in the background) as passive enforcers of the will of the parties embodied in their contractual agreements.

This simplistic view of the role of courts stems from the fact that in a world with complete contracts, to behave as a passive enforcer is clearly the best that a court that is interested in maximizing contracting parties' welfare can do. In the "classical" world of modern economic theory, contracts *are* complete.

In a world in which complete contracts are not feasible it is no longer obvious that a court should be a passive enforcer, and in fact it is no longer true. For example, the contracting parties may face some uninsurable risk and the court may improve their welfare if it is able to use some information available ex-post and excuse performance in some eventualities.[1]

Once the way for an active court is open, a host of related questions naturally arise. The aim of this paper is to address the following one. Suppose that the court *cannot* condition (ex-ante or ex-post) on any variable that cannot be contracted on by the parties themselves. Is it then the case that the court can play any welfare-enhancing role?

The answer to the question above is "yes" if the parties are asymmetrically informed at the time they contract and the court maximizes their ex-ante welfare, that is, their expected welfare *before* either party gets information not available to the other. Asymmetry in parties' information at the time they contract can lead to a "lemons-like" situation in which adverse selection leads to inefficient contracts. courts that do not simply enforce contracts as they are written can sometimes ameliorate the inefficiency that results from asymmetric information.

[1]This is the case, for instance, in Anderlini, Felli, and Postlewaite (2007).

We show in the paper that in a world where contracting parties are asymmetrically informed this is indeed the case. We also derive the optimal decision rule for an active welfare-maximizing court. This rule implies that the court in equilibrium voids contracts that the contracting parties (at the contracting stage) would like the court to enforce.

The potential benefit of a court's voiding explicit contractual clauses stems from asymmetry of information between the parties at the time they contract. Because of asymmetric information, when the court does not intervene, inefficient trades may take place: in equilibrium some (inefficient) pooling may obtain. By intervening and voiding some contractual clauses, the court may be able to negate the incentives for some types to hide their private information, thus making the pooling no longer profitable for them. In other words, voiding contracts in some cases will decrease the expected gain from withholding private information, thereby promoting disclosure and hence increasing ex-ante welfare. Clearly voiding some contractual clauses will come at a cost: some surplus-generating trades will no longer take place. However, there will be a net ex-ante welfare gain when the improvement from the additional disclosure outweighs the inefficiency from voiding.

The view that courts should maximize ex-ante welfare is a compelling one. If the parties were able to meet at the ex-ante stage (when they are symmetrically informed) agreements could be reached that circumvent inefficiencies that are unavoidable at the interim stage when the parties have private information. A court that maximizes ex-ante expected welfare will choose the same contingent rules of behavior as the parties would have chosen at that stage, were it possible. In other words, if the parties *could* meet at that point, they might *instruct* the court to void some contracts they might subsequently write. They will do this precisely because the parties will understand that while they may regret this in some circumstances, it may promote the disclosure of private information. This disclosure may increase the efficiency of contracting to an extent that more than outweighs any negative consequences of the court's intervention. The problem that the court is solving is that the parties are often *unable* to meet before the arrival of their private information. A court that maximizes ex-ante welfare acts as a *commitment* device that remedies the parties' inability to contract at the ex-ante stage.

1.1. The Role of Courts in Promoting Disclosure of Information

Courts have had an interest in promoting disclosure of information at least since the English case of Hadley vs. Baxendale in 1854.[2] The court held in that case that a defendant who breached a contract was liable only for damages that might reasonably have arisen given the known facts rather than the higher damages that were actually suffered because of circumstances known only to the plaintiff. As argued in Adler (1999), the limitation on damages implicit in the Hadley rule is a default that is often viewed as promoting disclosure: "A party who will suffer exceptional damages from breach need only communicate her situation in advance and gain assent to allowance so that the damages are unmistakably in the contemplation of both parties' at the time of contract."[3] The discussion of the role of courts in promoting information disclosure, to our knowledge, focusses primarily on the benefit of disclosure to the contracting parties. In the absence of disclosure, resources will be wasted in writing needless waiver clauses and inefficient precaution.

Courts will have an interest in promoting disclosure of information in our model, but for a very different reason, and with very different consequences. Courts will affect the amount of information that is revealed by informed parties through their treatment of contracts that reveal little information. While contracts may reveal little information simply because the parties *have* little information, courts will treat such contracts more harshly than they otherwise might because of the incentive effects such treatment will have on informed parties. Those with relevant information will reveal it in order that courts will more likely enforce the agreements that are made. Thus, courts are not examining a contract brought before them solely to uncover the parties' intent. They also take into consideration how the treatment of the contract

[2] 9 Exch. 341, 156 Eng. Rep. 145. (Court of Exchequer, 1854).

[3] See Ayres and Gertner (1989) and Bebchuk and Shavell (1991) for a discussion of the Hadley rule and it's role in promoting disclosure. See also Maskin (2005) for a critical view.

will affect contracting parties different from the parties before them.

1.2. Related Literature

There is a growing literature that explicitly models the role of courts in contractual relationships. Bond (2003) and Usman (2002) model the agency problems (moral-hazard) that stem from hidden actions that the court itself can take, while Levy (2005) models the effect on the court's decision of the judge's career concern. Bond (2003) analyzes optimal contracting between parties when judges can impose an outcome other than the contracted outcome in exchange for a bribe. Bond shows that in a simple agency model, this possibility will make the contracting parties less likely to employ high-powered contracts. Usman (2002) lays out a model in which contracts contain variables that are not observable to courts unless a rational and self-interested judge exerts costly effort. Usman (2002) analyzes contracting behavior and the incentive to breach when judges value the correct ruling but dislike effort. Levy (2005) analyzes the trade-off that arises when the judge in ruling on a dispute is, at the same time, trying to influence the perception of the public (or an evaluator) about his own ability. This trade-off can induce the judge to distort his decision to avoid his decision being appealed and possibly reversed.

The courts in these papers are governed by a judge who maximizes his or her personal utility. In contrast to these papers, there is a literature that analyzes courts that maximize the expected welfare of the contracting parties. Posner (1998) analyzes whether a court should consider information extrinsic to the contract in interpreting the contract. Closer to the current paper, Ayres and Gertner (1989) and Bebchuk and Shavell (1991) analyze the degree to which courts' interpretation of contracts affect incentives to reveal private information. The focus of this work is the effect of different court rules regarding damages for breach of contract on the incentives for parties to disclose information regarding the costs of breach at the time of contracting. Shavell (2006) presents a general examination of the role of courts in interpreting contracts.

The present paper analyzes the role of a welfare-maximizing court that can affect the type of contracts that are written by excusing performance (voiding the contract) in some circumstances. The possibility of welfare improvements are a consequence of the effect of the court's rules for enforcing contracts on the parties' incentives to reveal private information. Our paper differs from Ayres and Gertner (1989), Bebchuk and Shavell (1991) and Shavell (2006) in that we focus on the externality that informed contracting parties may impose on uninformed contracting parties, which is absent from these papers.

Unlike Ayres and Gertner (1989), Bebchuk and Shavell (1991) and Shavell (2006), our focus is on the externality that informed contracting parties may impose on uninformed contracting parties, which is absent from these papers.

1.3. Outline

The plan of the rest of the paper is as follows. We present a simple example illustrating how courts may increase welfare by selectively voiding contracts in the next Section and the general model and analysis in Sections 3, 4, 5, 6 and 7. Section 8 concludes the paper. For ease of exposition all proofs have been gathered in the Appendix.[4]

2. Example

Our main aim in this paper is to investigate the role of courts as *active* players in contractual situations, and to demonstrate that an active court can sometimes increase contracting parties' welfare by voiding voluntary contracts. We will illustrate this with a simple example.

Consider a homeowner (HO) dealing with a contractor on home improvements. The HO wants to replace a beam in his roof. There is a large number of potential contractors, and the buyer can make a take-it-or-leave-it offer to a contractor, who will accept an offer if and only if it covers his costs. After the contract is signed, the HO has to sink the cost of temporarily moving out of the property, which we take to 1. There are two types of homeowners: Careful and Careless. The Careful HO has maintained his home properly and gets a relatively low value from the replacement

[4]In the numbering of Propositions, Lemmas, equations and so on, a prefix of "A" indicates that the relevant item can be found in the Appendix.

beam, 4. The Careless HO has skipped all normal maintenance and is aware that his house may fall down if the beam is not replaced, resulting is a much higher value from replacing the beam, 26. The cost to the contractor of replacing the beam is 1, independent of whether the homeowner is Careful or Careless. The HO has the option of getting a building permit for the replacement at a cost of 4. The building permit plays no role in the values other than as a cost to the HO. Thus, the costs to the contractor (c) and the values to the buyer (v), gross of the moving cost of 1, are given in the table below.

	Beam With Permit	Beam W/Out Permit
Careless HO	$v = 22, \quad c = 1$	$v = 26, \quad c = 1$
Careful HO	$v = 0, \quad c = 1$	$v = 4, \quad c = 1$

The HO knows whether he is Careful type or the Careless type, but the contractor knows only that it is equally likely that the homeowner is Careful or Careless. Given our assumption that the HO can make a take-it-or-leave-it offer to the contractor, it is clear that the only equilibrium here is a pooling equilibrium in which both types of homeowner make an offer to the contractor to put in the beam without a permit at a price of 1.

We now assume that once the contract has been signed, it is possible for the homeowner and the contractor to add an additional job to be done on the house without any additional investment on the part of the HO. During the initial construction work, it is found that the HO's basement is damp, and the homeowner would like this corrected. Assume that the bargaining positions have been reversed now that the contractor's crew is on site. Specifically, assume that the contractor now has all the bargaining power and can make a take-it-or-leave-it offer to the homeowner to fix the basement.[5] There is a fundamental difference between the basement and the beam projects, however. The benefits to the Careless HO are 76, but the cost is high

[5]The assumption that the homeowner has all the bargaining power ex-ante and the contractor all the bargaining power ex-post is for expository purposes. Similar examples can be constructed so long as the HO does not have all the bargaining power both ex-ante and ex-post.

– 100 – as a consequence of the Careless HO's neglect. The benefits to the Careful HO are less, 65, but the costs to the contractor for this HO are minimal: 3. The costs are not observable to the contractor and will only be known after the contract to do the work is signed (if it is, in fact, signed). The costs and benefits are shown in the augmented table below, again gross of the moving cost of 1.

	Beam With Permit	Beam W/Out Permit	Dry Basement
Careless HO	$v = 22, \quad c = 1$	$v = 26, \quad c = 1$	$v = 76, \quad c = 100$
Careful HO	$v = 0, \quad c = 1$	$v = 4, \quad c = 1$	$v = 65, \quad c = 3$

Assuming that the court enforces all contracts, the game between the HO and the contractor involves the HO making a take-it-or-leave-it offer to the contractor in stage 1, following which the contractor makes a take-it-or-leave-it offer to the HO in stage 2. We assume that the costs and benefits are not verifiable, hence offers by the contractor to fix the basement on a cost-plus basis are not possible. Since both types of homeowner make the same offer in stage 1, the contractor's options are restricted to make an offer to dry the basement at a given price, independent of which HO he faces. It is easy to see that the contractor will offer to do this at a price of 65. At this price the contractor's expected cost is 52.5, yielding him a profit of 12.5. The only change if he were to offer to take on the job at a lower price is that his revenue decreases. At any price greater than 65 but no greater than 76, only the Careless HO would accept the offer, giving the contractor a negative payoff, while neither type accepts any offer at a price higher than 76.

It is straightforward to verify that the unique perfect Bayes equilibrium for the two-stage game has both types of homeowner pooling on the contract that offers the contractor 1 to put in the beam without a permit, followed by the contractor offering to dry the basement at a price of 65. There is an inefficiency in this contract relative to the first-best outcome in that the contractor takes on the job of drying the basement for the Careless HO. In this case, the cost is greater than the benefit; efficiency would dictate that the job not be done in this case. We will next argue that there is a welfare improvement if the court voids contracts to put in a beam without a permit.

Suppose that the court enforces all contracts except those involving putting in a beam without a permit. We next describe the unique perfect Bayes equilibrium when these contracts are not enforced. As before, any offer to put in a beam with a permit at a price at least 1 will be accepted by the contractor, while any offer at a lower price will be rejected. Thus, the Careless HO will offer the contractor 1 to put in the beam with a permit, and the Careful HO will not make any offer in stage 1. Since the two types of homeowner separate in stage 1, in stage 2 the contractor will know the cost of drying the basement for each type of homeowner. Thus, he will make no offer to dry the basement to the Careless HO, and offer to dry the basement for a price of 65 to the Careful HO, who obviously will accept the offer. The only remaining detail to be checked is that the Careless HO has no incentive to pool with the Careful HO in the first stage by not making an offer to put in the beam with a permit, thereby getting an offer to dry the basement in the second stage. Getting an offer in the second stage to dry his basement for a price of 65 gives the Careless HO a gain of 11 (given by $76 - 65$) in the second stage, but results in the loss of a net gain of 21 in the first stage.

The expected surplus in the unique perfect Bayes equilibrium when the court enforces all contracts is $1/2 \times$ (surplus to Careless HO) $+ 1/2 \times$ (surplus to Careful HO)$-$HO's Investment$= 1/2[(25 + (-24)) + (3 + 60)] - 1 = 31$, while the expected surplus in the unique perfect Bayes equilibrium when the court voids contracts to put in the beam without a permit is $1/2[(21+0-1)+(0+60)] = 40$. Thus, a court voiding those contracts to put in a beam without a permit increases the expected surplus by 9 relative to the surplus when the court enforces all contracts. A court that voids contracts without a permit induces the two types of homeowner to separate, and the consequent increase in information leads to efficient contracting in stage 2.

The welfare criterion employed in this calculation is ex-ante expected surplus. That is, we are taking the expected surplus across the two types of the homeowner. The ex-ante gain in surplus is accompanied by a redistribution of net benefits across the two types: the Careless HO is worse off when the court voids contracts without permit and the Careful HO is better off, sufficiently so as to more than offset the decrease in net benefit to the Careless HO. We argue below that this is the appropriate welfare criterion for such problems.

The example is special in several ways, and we neither argue that real-world courts will frequently be confronted with such cases, nor that there is a clear guide for real-world courts as to when to void contracts to induce information revelation. Our point is that such cases *do* exist, and to the extent that courts are able to identify them, voiding is desirable.

We turn next to a more general examination of such problems.

3. The Model

3.1. Passive Courts

In this section we extend our analysis of the example to general values to allow a better understanding of the characteristics of situations in which a court can increase welfare by selectively voiding contracts.

A buyer $\mathcal{B}$ and a seller $\mathcal{S}$ face a potentially profitable trade of three widgets, denoted w_1, w_2 and w_3 respectively. Widgets w_1 and w_2 are "specific." They require a widget- and relationship-specific investment $I > 0$ on $\mathcal{B}$'s part. The buyer can only undertake one of the two widget-specific investments. The value and cost of both w_1 and w_2 are zero in the absence of investment, and we assume that it is possible to undertake at most one of the two possible widget-specific investments.

Widget w_3 is not specific. Its cost and value do not depend on any investment. We assume that w_3 is *not contractible* at the ex-ante stage. This is with little loss of generality, except for the case in which "menu contracts" are allowed.[6] Widget w_3 can be traded regardless of any ex-ante decision. In practice, we can think of w_3 as being traded (or not) at the ex-post stage.

[6]We discuss menu contracts in Section 7 below.

The buyer has private information at the time of contracting. He knows his type, which can be either α or β. Each type is equally likely, and the seller does *not* know $\mathcal{B}$'s type.

To complete the description of our trading set-up, it is now sufficient to specify the cost and value of each widget, for each possible $\mathcal{B}$ type, when investment takes place. We specify them using the smallest number of parameters that we believe are necessary for our results to hold. This is for the sake of simplicity only. The costs and values in the six combinations of of types and widgets could be specified independently without affecting our results provided that the appropriate assumptions hold, but they would be less transparent. With this in mind, we take the cost and value of the three widgets to be as in the table below, where they are represented *net* of the cost of investment $I > 0$.[7] In each cell of the table, the left entry represents surplus, and the right entry represents cost (obviously the sum of the two gives the value, net of investment cost).

	w_1	w_2	w_3
Type α	$\Delta_M, \quad c_L$	$\Delta_H, \quad c_L$	$-\Delta_H, \quad c_H$
Type β	$\Delta_N, \quad c_L$	$\Delta_L, \quad c_L$	$\Delta_S, \quad c_S$

(1)

For the remainder of the paper, we take these parameters to satisfy the following.

Assumption 1. <u>*Parameter Values*</u>*: The values of cost and surplus in the matrix in (1) satisfy*[8,9]

(i) $0 < \Delta_L < \Delta_M < \Delta_H$

and

[7]The *gross* value is therefore computed as the sum of cost, surplus and I, while the *gross* cost is the cost value reported in table (1).

[8]To fix ideas, it might be useful to consider one possible set of values that satisfy all the conditions needed. These are $\Delta_N = -1$, $\Delta_L = 2$, $\Delta_M = 20$, $\Delta_H = 24$, $\Delta_S = 62$, $c_L = 1$, $c_S = 3$ and $c_H = 100$.

[9]The numbers in the example above would have to be modified slightly to satisfy these assumptions, which are somewhat stronger than are necessary to generate the phenomenon exhibited there. These stronger assumptions will make the equilibria robust against menu contracts; we discuss this in 7 below.

(ii) $\Delta_M + \Delta_H < \Delta_S$

and

(iii) $c_S + \Delta_H + \Delta_S + \frac{\Delta_M}{2} < c_H < \Delta_S + 2\,\Delta_M$

and

(iv) $0 < -\Delta_N < \Delta_H - \Delta_M - \Delta_L$

and

(v) $c_L < c_S$

The costs and values of the three widgets are *not contractible.* Any contract between $\mathcal{B}$ and $\mathcal{S}$ can only specify the widget(s) to be traded, and price(s).

We interpret this contractibility assumption in the following way. The court can only observe (verify) which one of w_1 or w_2 is specified in any contract, and whether the correct widget is traded or not as prescribed, and the appropriate price paid.

It is important to notice that the court never has information that is superior to the trading parties. In fact, ex-ante the court does not know $\mathcal{B}$'s type, and hence has information that matches the seller's. Ex-post the court has information that is inferior to both trading parties, since $\mathcal{S}$ will eventually discover his cost of production and hence $\mathcal{B}$'s type.[10]

To keep matters simple, we assume that $\mathcal{B}$ has all the bargaining power at the ex-ante contracting stage, while $\mathcal{S}$ has all the bargaining power ex-post. The flavor of our results would be preserved under less extreme assumptions about bargaining power. What is needed is that $\mathcal{B}$ does not have full bargaining power ex-post since this would eliminate the need for an ex-ante contract. Even without a contract $\mathcal{B}$ would invest in one of the specific widgets (depending on his type), and all prices could be determined ex-post.

To sum up, the timing and relevant decision variables available to the trading parties are as follows.

[10]See the timing structure of the model described in detail below.

The buyer learns his type *before* meeting the seller. Then $\mathcal{B}$ and $\mathcal{S}$ meet at the ex-ante contracting stage. At this point $\mathcal{B}$ makes a take-it-or-leave-it offer of a contract to $\mathcal{S}$, which $\mathcal{S}$ can accept or reject. A contract consists of a pair $s_i = (w_i, p_i)$, with $i = 1, 2$ specifying a single widget to trade and at which price. After a contract (if any) is signed, $\mathcal{B}$ decides whether to invest or not, and in which of the specific widgets.

After investment takes place (if it does), the bargaining power shifts to the seller and we enter the ex-post stage. At this point $\mathcal{S}$ makes a take-it-or-leave-it offer to $\mathcal{B}$ on whether to trade any widget not previously contracted on and at which price, which $\mathcal{B}$ can accept or reject. Without loss of generality, we can restrict $\mathcal{S}$ to make a take-it-or-leave-it offer to $\mathcal{B}$ on whether to trade w_3 and at which price p_3. After $\mathcal{B}$ decides whether to accept or reject $\mathcal{S}$'s ex-post offer (if any), production takes place. First $\mathcal{S}$ produces the relevant widgets and then he learns his cost.[11] Finally, delivery and payment occur according to contract terms.

3.2. Active Courts

The trading set up described in Subsection 3.1 is effectively a two-player game between $\mathcal{B}$ and $\mathcal{S}$. The court is a "dummy" player whose strategy is *fixed.* It simply enforces the contract terms, by imposing large penalties if they are not observed. As a result, delivery and payment occur in the last stage of the game, exactly as agreed.

We now model the active court as a third player, $\mathcal{C}$, who makes a non-trivial choice before any contract is signed at the ex-ante stage. In particular, $\mathcal{C}$ can *credibly* announce that it will enforce some contracts, but not others. This announcement is known to both $\mathcal{B}$ and $\mathcal{S}$ at the time of contracting.

The information of $\mathcal{B}$, $\mathcal{S}$ and $\mathcal{C}$ and their bargaining power remain as described above. The timing, investment requirements and all the elements of the matrix in (1) also stay the same.

[11] The reason to assume that production costs are *sunk* before $\mathcal{S}$ learns what they are is to prevent the possibility of ex-post revelation games a la Moore and Repullo (1988) and Maskin and Tirole (1999). We return to this point below.

The court announces a set of ex-ante contracts $\mathcal{U}$ which will be "upheld" and a set of ex-ante contracts $\mathcal{V}$ which will be "voided." There are two contracts in all to be considered, one of the type $s_1 = (w_1, p_1)$ and another of the type $s_2 = (w_2, p_2)$. We restrict $\mathcal{C}$ to be able to announce that certain contracts will be upheld or voided, *only according to the widget involved.* Therefore $\mathcal{U}$ and $\mathcal{V}$ are two mutually exclusive subsets of $\{s_1, s_2\}$ with $\mathcal{U} \cup \mathcal{V} = \{s_1, s_2\}$, so that effectively the court's strategy set consists of a choice of $\mathcal{V} \subseteq \{s_1, s_2\}$.

For the moment we restrict $\mathcal{C}$ to make deterministic announcements; each contract is either in $\mathcal{V}$ or not with probability one.

If $\mathcal{V} = \emptyset$ so that all contracts are enforced, then the model is exactly as described in Subsection 3.1 above. If on the other hand one or two contracts are in $\mathcal{V}$, in the final stage of the game $\mathcal{B}$ and $\mathcal{S}$ are free to renegotiate the terms (price and delivery) of any widget in the voided contract, regardless of anything that was previously agreed.[12] Notice that, by our assumptions on bargaining power, this means that $\mathcal{S}$ is free to make a take-it-or-leave-it offer to $\mathcal{B}$ of a price p_i at which any w_i with voided contract terms is to be delivered.[13]

The court is a welfare-maximizing player. It chooses $\mathcal{V}$ so as to maximize its payoff which equals the *sum* of the payoffs of $\mathcal{B}$ and $\mathcal{S}$.[14]

Before proceeding with the equilibrium analysis, for completeness, we identify the

[12] As well as negotiating the terms of trade for w_3, as before.

[13] Implicitly, we are taking the view that trade is feasible ex-post even when contract terms are voided by the court. This in turn means that $\mathcal{C}$ will always act as a "minimal enforcement" institution. It is not hard to see that our results remain true, and in fact easier to prove, if we took the view that when contract terms are voided then trade becomes infeasible because even "spot" trading arrangements are not enforced. One way to see this is to notice that in a sense we are implicitly considering two types of possible contracts for widgets w_2 and w_1: ex-ante contracts, which the court can void or uphold, and ex-post (or "spot") contracts, which we assume the court will uphold. If the court were to void the ex-post contracts trade of the relevant widget would become infeasible.

[14] Clearly, following a particular choice by $\mathcal{C}$ multiple equilibrium payoffs could ensue in the relevant subgame. This, for the time being, is a moot issue. In Sections 4 and 5, our analysis relies only on subgames with a unique equilibrium. In Sections 6 and 7 below this is no longer the case. When multiple equilibria arise in some relevant subgames, we deem something to be an equilibrium of the entire model when it is an equilibrium considering the court as an actual player, complete with its equilibrium *beliefs*. For more on the distinction between a classical "planner" and a planner who is also a player see Baliga, Corchon, and Sjöström (1997).

efficient investment and trading outcome. The following is stated without proof since it is an obvious consequence of the costs and surplus matrix (1).

Remark 1. *Efficient Trade: The unique efficient investment and trading outcome is as follows. Both types of $\mathcal{B}$ invest and trade w_2. The type β buyer trades w_3, while the type α buyer does not.*

Since the two types of $\mathcal{B}$ are equally likely, the total amount of expected surplus (net of investment) in this case is $\frac{\Delta_S}{2} + \frac{\Delta_H}{2} + \frac{\Delta_L}{2}$. By definition, this is also the court's payoff.

Efficiency is the benchmark to evaluate the equilibria of the model, which we are now ready to characterize in the two cases of passive and active courts.[15]

4. Passive Court Equilibria

As we anticipated, when all contracts are enforced, inefficient pooling obtains in equilibrium.

Proposition 1. *Equilibrium With A Passive Court: Suppose the court enforces all contracts, and that Assumption 1 holds. Then the unique equilibrium outcome of the model is that the two types of buyer pool with probability one: they both invest and trade w_2 at a price $p_2 = c_L$, and they both trade w_3 at a price $p_3 = \Delta_S + c_S$.*

The total amount of expected surplus (net of investment) in this case is given by $\frac{\Delta_S}{2} + \frac{\Delta_L}{2}$. By definition, this is also the court's payoff.

The equilibrium outcome in Proposition 1 is inefficient in the sense that, in equilibrium w_3 is traded by the type α buyer; this trade generates a net surplus of $-\Delta_H$.

[15] Throughout the paper, by equilibrium we mean a Sequential Equilibrium (Kreps and Wilson 1982), or equivalently a Strong Perfect Bayesian Equilibrium (Fudenberg and Tirole 1991), of the game at hand. We do not make use of any further refinements. However, it should be pointed out that whenever we assert that something is an equilibrium outcome, then it is the outcome of at least one Sequential Equilibrium that passes the Intuitive Criterion test of Cho and Kreps (1987).

The reason separation is impossible to sustain as an equilibrium outcome with passive courts is not hard to outline. In any separating equilibrium, it is clear that the type β buyer would trade w_3 ex-post for a price $p_3 = \Delta_S + c_S$. The type β buyer would also trade w_2 for a price $p_2 = c_L$ (this is in fact true in *any* equilibrium in which the court does not void contracts for w_2). Given that the type β buyer trades both w_2 and w_3, the type α will always gain by deviating and pooling with the the type β buyer.

5. Active Court Equilibria

A court that actively intervenes and voids contracts for w_2 will be able to induce separation between the two type of buyer and increase expected welfare.

Proposition 2. *Equilibrium With An Active Court: Suppose the court is an active player that can choose $\mathcal{V}$ as above, and that Assumption 1 holds. Then the unique equilibrium outcome of the model is that $\mathcal{C}$ sets $\mathcal{V} = \{s_2\}$ and the two types of buyer separate: the type α buyer invests and trades w_1 at a price $p_1 = c_L$ and does not trade w_3; the type β buyer does not invest and only trades w_3 at a price $p_3 = \Delta_S + c_S$.*

The total amount of expected surplus (net of investment) in this case is given by $\frac{\Delta_S}{2} + \frac{\Delta_M}{2}$. By definition, this is also the court's payoff.

When the court voids contracts for either w_1 or w_2, the corresponding widget will not be traded in equilibrium. This would be true for completely obvious reasons if the court's voiding makes the trade not *feasible*. It is also true when the court allows in principle the trade of the widget ex-post acting as a minimal enforcement agency (see footnote 13 above). This is because a classic hold-up problem obtains in our model, driven by the relationship- and widget-specific investment. Given that the seller has all the bargaining power ex-post, unless an ex-ante contract is in place the buyer will be unable to recoup the cost of his investment and hence will not invest.

To see why the court's intervention induces the two types of buyer to separate at the contract offer stage consider the incentives of the type α buyer to deviate from the separating equilibrium described in Proposition 2. With a passive court, pooling with the type α buyer involves positive payoffs *both* in the trade of w_2 and in that of w_3 ex-post. Now that the court renders the trade of w_2 impossible in equilibrium, the payoff to the type α buyer from deviating to pool with the type β buyer comes only from the ex-post trade of w_3. This decrease is enough to sustain the separating equilibrium of Proposition 2.

The court's intervention has two direct effects. One is separation, so that the type α buyer no longer inefficiently trades w_3, and the other is the lack of trade of w_2. While the first increases expected welfare, the second reduces it. Overall expected welfare increases by $(\Delta_M - \Delta_L)/2$

6. Stochastic Courts

Propositions 1 and 2 together say that while inefficient pooling obtains when the court enforces all contracts, this can be avoided when the court credibly *announces* that it will void any contract for w_2.

In the equilibrium in Proposition 2 the court effectively forbids a profitable investment and trade. The surplus, net of I, generated by w_2 is strictly positive for both types of buyer. A natural question then arises at this point. Can any of this lost surplus be recovered by the court, without losing the advantage gained by inducing separation as in Proposition 2?

The answer is that, provided that I is not too large, some of this surplus can in fact be recovered by inducing an equilibrium like the one in Proposition 2, but in which the trade of w_2 is allowed. Suppose the court voids contracts for w_2 with probability strictly between zero and one. If this probability is too small, then using the logic of Proposition 1, inefficient pooling will obtain in equilibrium. The probability that the court voids contracts for w_2 must be high enough for the parties to separate. If the probability that the court voids contracts for w_2 is too large then neither type of buyer will invest in w_2 since the investment in w_2 yields a return of zero to the buyer when the contract is voided.

To sum up, the lost surplus from w_2 may be recovered in an equilibrium that is similar to the one in Proposition 2 but in which w_2 is traded if the probability that the court voids contracts for w_2 is neither too low nor too high. However, this range shrinks as investment becomes more expensive. Consequently, I must be sufficiently low for this range to be nonempty.

Notice that if, say, the type β buyer invests in w_2 when the court voids the ex-ante contract to trade w_2 the parties can still renegotiate and trade w_2 at an ex-post stage.[16] However, following the court's decision to void the ex-ante contract, the trade of w_2 will occur at a higher price since at the renegotiation stage the seller has all the bargaining power and hence the price will transfer the entire surplus to the seller. In particular, if the court upholds the contract to trade w_2 trade will occur at the price that reflects the buyer's bargaining power, $p_2 = c_L$, while if the court voids the contract to trade w_2 trade will occur at the renegotiated price $p_2' = c_L + \Delta_L + I$. Similar considerations apply to the trade of w_1.

The interpretation of a stochastic court is straightforward. Laws and the body of precedents are sufficiently ambiguous in many cases. The choice of interpretation in such cases effectively makes a court stochastic from the contracting parties' point of view.

Denote by μ_1 and μ_2 respectively the probabilities that the court voids contracts for w_1 and w_2 respectively. Let $\mathcal{F} = (\mu_1, \mu_2)$.

Proposition 3. *Equilibrium With A Stochastic Court: Suppose that Assumption 1 holds, and that the court is an active player that can choose $\mathcal{F}$ as above.*

Assume also that $I > 0$ satisfies:

$$I < \frac{\Delta_L (\Delta_M + \Delta_H + \Delta_S - c_H + c_S)}{c_H - \Delta_L - \Delta_M - \Delta_S - c_S} \tag{2}$$

[16]As discussed in footnote 13, we take the view that trade is feasible ex-post even when contract terms are voided by the court. Of course in this case the terms of trade of w_2 are renegotiated and hence will differ from the ones specified by the ex-ante contract. In particular, while the buyer has all the bargaining power at the ex-ante stage the seller has all the bargaining power ex-post.

Then it is optimal for $\mathcal{C}$ to set $\mathcal{F} = (0, \mu)$ where $\mu \in [\mu^*, \mu^{**}]$ with

$$\mu^* = \frac{c_H - \Delta_M - \Delta_S - c_S}{\Delta_H + I}, \qquad \mu^{**} = \frac{\Delta_L}{\Delta_L + I} \tag{3}$$

and the two types of buyer separate.[17] *The type α buyer invests and trades w_1 at a price $p_1 = c_L$ and does not trade w_3. The type β buyer, on the other hand, invests and trades w_2 and w_3. The trade of w_2 occurs at a price $p_2 = c_L$ with probability $(1 - \mu)$ and at a renegotiated price $p_2' = c_L + \Delta_L + I$ with probability μ while the trade of w_3 occurs at a price $p_3 = \Delta_S + c_S$.*

The total amount of expected surplus in this case is given by $\dfrac{\Delta_S}{2} + \dfrac{\Delta_M}{2} + \dfrac{\Delta_L}{2}$. By definition, this is also the court's payoff.

7. Menu Contracts

In two separate papers, Maskin and Tirole (1990, 1992) examine the general case of an "Informed Principal" problem. Among other insights, they point out that, under certain conditions a "menu contract" equilibrium may Pareto improve upon other contracting arrangements.

A menu contract, roughly speaking, is a pooling contract offered by different types of Principal which the Agent can accept or reject, before any of the Principal's private information is revealed. The menu contains an array of different contractual arrangements, one for each possible type of Principal. After the Agent accepts the contract, which immediately becomes binding, the Principal announces his type to the Agent, and hence determines which part of the menu array will regulate their relationship from that point on.

The buyer in our model has private information and, ex-ante, makes a take-it-or-leave-it offer to the seller. Therefore he is an informed Principal.[18] Since our Proposition 1 asserts that with a passive court the equilibrium outcome is inefficient,

[17] Using the numbers mentioned in footnote 8, the left-hand side of (2) equals 6/13. If we set $I = 1/3$ to satisfy (2), from (3) we obtain $\mu^* = 45/73$ and $\mu^{**} = 6/7$.

[18] In the terminology of Maskin and Tirole (1990, 1992) we are in the case of "Common Values" examined in more detail in Maskin and Tirole (1992).

a legitimate question is whether menu contracts can yield superior investment and trading outcomes than the equilibrium outcomes we have identified above.

Allowing menu contracts would change somewhat the terms on which our model justifies court intervention, but still provides a robust rationale for active courts. Anderlini, Felli, and Postlewaite (2006) extends the analysis in this paper to the case in which menu contracts are allowed. Roughly speaking, the results can be summarized as follows. If we maintain the assumption that w_3 is not contractible ex-ante, our conclusions of Sections 4 and 5 hold essentially unchanged. However, if we allow ex-ante contracting on w_3, *as well as* menu contracts the picture changes. When menu contracts and ex-ante contracting on w_3 are both allowed, if the court enforces all contracts, *multiple* equilibrium outcomes obtain. Pooling as in Proposition 1 is an equilibrium. However, the model also has an equilibrium in which a (non-trivial) menu contract is offered and the same separating outcome as in Proposition 2 obtains. Clearly, even in this case an active court has a role in eliminating any possibility for the parties to inefficiently pool in equilibrium.

8. Conclusion

Our main result (Propositions 1 and 2) can be viewed as identifying a kind of "second best" phenomenon in an incomplete contract world. We start with a model in which some degree of contractual incompleteness is assumed (the costs and values of each widget are not verifiable and hence not contractible). In this world it is in fact welfare-improving to *impose* further incompleteness by making some contracts effectively impossible in equilibrium. This is what our active court does. This is similar to the finding in Bernheim and Whinston (1998) that under some conditions, when one assumes that contracts are exogenously coarse, equilibrium contracts may be even coarser than the constraints impose. However, our main result differs from theirs in that it does not assert that contracts will be coarse (or incomplete) in equilibrium. Rather it asserts that *imposing* incompleteness can increase expected welfare.

Appendix

Lemma A.1: *Consider either the model with passive courts or any subgame of the model with active courts following the court's choice of $\mathcal{V}$. In any equilibrium of the model with passive courts, or of the subgame, w_3 is traded with positive probability by the type β buyer. Moreover, the equilibrium price of w_3 is $p_3 = \Delta_S + c_S$.*

Proof: We distinguish four, mutually exclusive, exhaustive cases.

Consider first a possible separating equilibrium in which the two $\mathcal{B}$ types each offer a distinct contract at the ex-ante stage. In this case, at the ex-post stage it is a best reply for type β buyers to accept offers to trade w_3 at a $p_3 \leq \Delta_S + c_S$. Their unique best reply is instead to reject any offers to trade w_3 at any $p_3 > \Delta_S + c_S$. By standard arguments it then follows that in equilibrium it must be that w_3 is traded between $\mathcal{S}$ and type β buyers at a price $p_3 = \Delta_S + c_S$.

The second case is that of a possible pooling equilibrium in which both types of $\mathcal{B}$ offer the same ex-ante contract to $\mathcal{S}$ with probability 1. In this case the beliefs of $\mathcal{S}$ at the ex-post stage are that $\mathcal{B}$ is of either type with equal probability. The type β buyer best reply to offers to trade w_3 at the ex-post stage is as in the previous case. It is a best reply for type α buyers to accept offers to trade w_3 at a $p_3 \leq c_H - \Delta_H$. Their unique best reply is to reject any offers to trade w_3 at any $p_3 > c_H - \Delta_H$. Since Assumption 1 (parts ii and iii) implies that $c_H - \Delta_H > \Delta_S + c_S$, it now follows by standard arguments that only two outcomes are possible in equilibrium: either w_3 is traded between $\mathcal{S}$ and both types of $\mathcal{B}$ at a price $p_3 = \Delta_S + c_S$, or w_3 is not traded at all because $\mathcal{S}$ does not make an offer that is accepted by either type of $\mathcal{B}$. The seller's expected profit from trading w_3 at $p_3 = \Delta_S + c_S$ is given by $\Delta_S + c_S/2 - c_H/2$, which is positive by Assumption 1 (parts i, ii and iii). Therefore, $\mathcal{S}$ will choose to offer to trade w_3 at $p_3 = \Delta_S + c_S$. Hence the conclusion follows in this case.

The third case is that of a possible semi-separating equilibrium in which the type β buyer offers a separating contract at the ex-ante stage with probability strictly between zero and one. In this case, the same logic of the first case applies to show that in equilibrium it must be the case that $\mathcal{S}$ and the type β buyers who offer the separating contract trade w_3 at $p_3 = \Delta_S + c_S$.

The fourth and last case is that of a possible semi-separating equilibrium in which the type β buyer offers a separating contract at the ex-ante stage with probability zero. Since some type α buyers are separating, there must be some contract that the type β buyer offers in equilibrium which is offered by the type α buyer with a strictly lower probability. Since the ex-ante probabilities of the two types of buyer are the same, there is some contract offered in equilibrium by the type β buyer such that the seller's beliefs after receiving the offer are that he is facing a type α buyer with probability $\nu \in (0, 1/2)$. After this contract is offered and accepted, in any Perfect Bayesian

Equilibrium, the seller's beliefs when he contemplates making an offer to trade w_3 must also be that he faces the type α buyer with probability ν. Using the same logic as in the second case, only two possibilities remain. Either w_3 is traded at $p_3 = \Delta_S + c_S$, or $\mathcal{S}$ makes an offer that is not accepted. Given the beliefs we have described, the seller's expected profit from trading w_3 at $p_3 = \Delta_S + c_S$, is $\Delta_S + \nu c_S - \nu c_H$, which is positive using $\nu < 1/2$ and Assumption 1 (parts ii and iii). Hence $\mathcal{S}$ will choose to trade w_3 at $p_3 = \Delta_S + c_S$, and the conclusion follows in this case. ■

Lemma A.2: *Suppose that $\mathcal{C}$ enforces all contracts. Then in any equilibrium of the model w_2 is traded with probability one by the type β buyer at a price $p_2 = c_L$.*

Proof: Since the cost of w_2 is independent of $\mathcal{B}$'s type it is obvious that if it is traded, then it is traded at $p_2 = c_L$.

Suppose by way of contradiction that there exists an equilibrium in which with positive probability w_2 is not traded by the type β buyer. From Lemma A.1 we know that in this equilibrium some type β buyers trade w_3 at a price $p_3 = \Delta_S + c_S$. Therefore, type β buyers have a payoff of at most 0. (This follows from the fact that their expected profit from the w_3 trade is zero, and the maximum profit they can possibly make by trading w_1 is negative.) Consider now a deviation by the type β buyer to offering w_2 at $p_2 = c_L + \varepsilon$ with probability one. It is a unique best response for the seller to accept offers to trade w_2 at any $p_2 > c_L$. It then follows that the type β buyer can deviate to such offer and achieve a payoff of $\Delta_L - \varepsilon$. For ε sufficiently small this is clearly a profitable deviation for the type β buyer. ■

Lemma A.3: *Suppose $\mathcal{C}$ enforces all contracts. Then in any equilibrium of the model the type α buyer offers a contract to trade w_1 with probability zero.*

Proof: Notice that by Lemma A.2 in any equilibrium the type β buyer trades w_2 with probability one. Suppose by way of contradiction that there exists an equilibrium in which the type α buyer separates with positive probability and offers a contract to trade w_1. In this case, the type α buyer's payoff must be Δ_M. This follows from the fact that, by separating, the type α buyer must be trading w_1 at a price $p_1 = c_L$ and, since he separates, $\mathcal{S}$ will not trade w_3 with him.

Suppose now that the type α buyer deviates to pool with the type β buyers who trade w_2 at $p_2 = c_L$ and then trade w_3 at $p_3 = \Delta_S + c_S$. By Lemmas A.1 and A.2 we know that the type β buyer behaves in this way with positive probability. Following this deviation the type α buyer's payoff is $\Delta_H + c_H - \Delta_H - \Delta_S - c_S$. The latter, by Assumption 1 (parts i and iii) is greater than Δ_M. Hence this is a profitable deviation for the type α buyer. ■

Lemma A.4: *Suppose $\mathcal{C}$ enforces all contracts. Then in any equilibrium of the model w_2 is traded with probability one by the type α buyer at a price $p_2 = c_L$.*

Proof: Since the cost of w_2 is independent of $\mathcal{B}$'s type it is obvious that if it is traded, then it is traded at $p_2 = c_L$.

Suppose that the claim were false. Using Lemma A.3 we then know that, in some equilibrium, with positive probability the type α buyer trades neither w_1 nor w_2. By Lemma A.2 a type α buyer who does not trade w_2 actually separates from the type β buyer. Hence in any equilibrium in which with positive probability the type α buyer trades neither w_1 nor w_2 the type α buyer's payoff is at most zero. (The seller will not trade w_3 with him because of separation, and he makes no profit on either w_1 or w_2 since he does not trade them.)

As in the proof of Lemma A.3 the type α buyer has a profitable deviation from this putative equilibrium. He can pool with the type β buyers who trade w_2 at $p_2 = c_L$ and then trade w_3 at $p_3 = \Delta_S + c_S$. After this deviation the type α buyer's payoff is $\Delta_H + c_H - \Delta_H - \Delta_S - c_S$, which is positive by Assumption 1 (parts i and iii). ■

Lemma A.5: *Suppose that $\mathcal{C}$ enforces all contracts. Then in any equilibrium of the model w_3 is traded with probability one by both types of $\mathcal{B}$ at a price $p_3 = \Delta_S + c_S$.*

Proof: From Lemmas A.2 and A.4 we know that the two types of $\mathcal{B}$ pool with probability one at the ex-ante stage. The same reasoning as in the second case considered in the proof of Lemma A.1 now ensures that in equilibrium w_3 is traded with probability one by both types of $\mathcal{B}$ at a price $p_3 = \Delta_S + c_S$. ■

Proof of Proposition 1: The claim is a direct consequence of Lemmas A.2, A.4 and A.5. ■

Lemma A.6: *Consider the model with an active court, and any of the subgames following $\mathcal{C}$ choosing a $\mathcal{V}$ that contains w_i, $i = 1, 2$. In any equilibrium of such subgames neither type of $\mathcal{B}$ invests in w_i, and hence it is not traded.*

Proof: If $w_i \in \mathcal{V}$ then the terms of its trade can be freely re-negotiated at the ex-post stage, when $\mathcal{S}$ makes a take-it-or-leave-it offer to $\mathcal{B}$, regardless of anything previously agreed.

Now suppose that in any equilibrium both types of $\mathcal{B}$ invest in $w_i \in \mathcal{V}$ with positive probability. Then by standard arguments in any equilibrium it must be that $\mathcal{S}$ offers to trade w_i at a price p_i that makes one of the two $\mathcal{B}$ types indifferent between accepting and rejecting the offer at the ex-post stage. But this since $I > 0$ this must mean that one of the $\mathcal{B}$ types has an overall payoff equal to $-I$. Since either type of buyer can always guarantee a payoff of zero (by not investing and not trading) we can then conclude that in any equilibrium of any of these subgames it cannot be the case that both types of $\mathcal{B}$ invests in $w_i \in \mathcal{V}$ with positive probability.

Suppose then in any equilibrium only one type of $\mathcal{B}$ invests in $w_i \in \mathcal{V}$ with positive probability. Then by standard arguments in any equilibrium it must be that $\mathcal{S}$ offers to trade w_i at a price p_i that makes the type of buyer who is trading w_i indifferent between accepting and rejecting the offer at the ex-post stage. But this since $I > 0$ this must mean that this type of $\mathcal{B}$ has an overall payoff equal to $-I$. Since, as before, this type of buyer can always guarantee a payoff of zero we can now conclude that in any equilibrium of any of these subgames it must be that neither type of $\mathcal{B}$ invests in $w_i \in \mathcal{V}$ with positive probability. ■

Lemma A.7: *Consider the model with an active court. In any equilibrium of the subgame following $\mathcal{C}$ setting $\mathcal{V} = \{w_2\}$ the type α buyer trades w_1 with probability one.*

Proof: From Lemma A.6 we know that in this case neither type of $\mathcal{B}$ invests in w_2, and hence it is not traded.

Suppose that the type α buyer invests in w_1 and trades it. His payoff in this case is at least Δ_M. This is because clearly, in any equilibrium, p_1 is c_L, and at worst he is unable to trade w_3.

Suppose that instead the type α buyer does not invest in w_1 and hence does not trade it. Then his payoff is at most $c_H - \Delta_H - \Delta_S - c_S$. This is because, using Lemma A.1, at best he will be able to trade w_3 at a price $p_3 = \Delta_S + c_S$. Using Assumption 1 (part i and iii) we know that $\Delta_M > c_H - \Delta_H - \Delta_S - c_S$, and hence the argument is complete. ■

Lemma A.8: *Consider the model with an active court. In any equilibrium of the subgame following $\mathcal{C}$ setting $\mathcal{V} = \{w_2\}$ the type β does not invest in either w_1 or w_2, separates from the type α buyer, and only trades w_3 at a price $p_3 = \Delta_S + c_S$.*

Proof: From Lemma A.6 we know that in this case neither type of $\mathcal{B}$ invests in w_2, and hence it is not traded.

Suppose that the type β buyer invests in w_1. Then his payoff must be negative. This is because, using Lemma A.1, he either trades w_3 at a price $p_3 = \Delta_S + c_S$ or does not trade w_3 (in either case the profit is zero), and using Lemma A.7 he trades w_1 at a price $p_1 = c_L$.

Since either type of buyer can always guarantee a payoff of zero (by not investing, making offers that must be rejected, and rejecting all ex-post offers) we can then conclude that the type β buyer does not invest in w_1.

Therefore, we know that the type β buyer does not invest in either w_1 or w_2. Using Lemma A.7 and the same reasoning as in the first case of Lemma A.1 we can now conclude that the type β buyer trades w_3 at a price $p_3 = \Delta_S + c_S$. ■

Lemma A.9: *Consider the model with an active court. Suppose that $\mathcal{C}$ sets $\mathcal{V} = \{w_2\}$, then the two types buyer separate: the type α buyer invests in w_1 and only trades w_1 at a price of $p_1 = c_L$; the type β buyer does not invest in either w_1 or w_2 and only trades w_3 at a price $p_3 = \Delta_S + c_S$.*

By choosing $\mathcal{V} = \{w_2\}$ the court achieves a payoff of $\dfrac{\Delta_S}{2} + \dfrac{\Delta_M}{2}$.

Proof: The claim is a direct consequence of Lemmas A.7 and A.8. ■

Lemma A.10: *Consider the model with an active court. Suppose that $\mathcal{C}$ sets $\mathcal{V} = \{w_1\}$. Then the unique equilibrium outcome is that the two types of buyer pool with probability one: they both invest and trade w_2 at a price $p_2 = c_L$, and they both trade w_3 at a price $p_3 = \Delta_S + c_S$.*

By choosing $\mathcal{V} = \{w_1\}$ the court achieves a payoff of $\dfrac{\Delta_S}{2} + \dfrac{\Delta_L}{2}$.

Proof: The proof essentially proceeds in the same way as the proof of Proposition 1. In fact by setting $\mathcal{V} = \{w_1\}$, the court simply takes away the possibility that the parties may trade w_1 via Lemma A.6. The details are omitted for the sake of brevity. ■

Lemma A.11: *Consider the model with an active court. Suppose that $\mathcal{C}$ sets $\mathcal{V} = \{w_1, w_2\}$. Then the two types of buyer pool: they do not invest in either w_1 or w_2 and they trade w_3 at $p_3 = \Delta_S + c_S$.*

By choosing $\mathcal{V} = \{w_1, w_2\}$ the court achieves a payoff of $\dfrac{\Delta_S}{2} - \dfrac{\Delta_H}{2}$.

Proof: The claim follows immediately from Lemma A.6 using the same reasoning as in the second case of the proof of Lemma A.1. ■

Proof of Proposition 2: Using Assumption 1 (part i), the claim is an immediate consequence of Lemmas A.9, A.10 and A.11. ■

Lemma A.12: *Consider the model with a stochastic court, and any of the subgames following $\mathcal{C}$ choosing any feasible $\mathcal{F}$. In any equilibrium of any such subgame, w_3 is traded with positive probability by the type β buyer. Moreover, the equilibrium price of w_3 is $p_3 = \Delta_S + c_S$.*

Proof: The argument is identical to the proof of Lemma A.1. We do not repeat the details. ■

Lemma A.13: *Consider the model with a stochastic court, and any of the subgames following $\mathcal{C}$ choosing a $\mathcal{F}$ that contains $\mu_1 \in [0, 1]$. In any equilibrium of such subgames the type β buyer does not invests in w_1, and hence he does not trade w_1.*

Proof: Assume by way of contradiction that in some equilibrium the type β buyer invests in w_1 and w_1 is traded at $p_1 \geq c_L$. Then the type β buyer's payoff in this equilibrium would be $(1-\mu_1)(c_L + \Delta_N - p_1) - \mu_1 I$. Clearly for every $\mu_1 \in [0,1]$, using Assumption 1 (part i and iv), this payoff is negative. Therefore the type β buyer has a profitable deviation by not offering any contract and not investing. This deviation yields a zero payoff. ■

Lemma A.14*: Consider the model with a stochastic court, and any of the subgames following $\mathcal{C}$ choosing any feasible $\mathcal{F}$. Then it is not possible that in any equilibrium of such subgames the type α buyer invests and trades w_2 while the type β does not invest in (and hence does not trade) w_2.*

Proof: Recall that by Lemma A.12, in equilibrium the type β buyer trades w_3 for a price $p_3 = \Delta_S + c_S$ with positive probability.

Suppose that the outcome of the statement of the Lemma did obtain in some equilibrium. By Lemma A.13 we know that it must be the case that the type α buyer does not invest in and trade either w_1 or w_2. Therefore he must be trading w_3 ex-post at $p_3 = \Delta_S + c_S$.

In this putative equilibrium the type α buyer obtains a payoff of $(1-\mu_2)\Delta_H - \mu_2 I$. If instead he deviates and pools with the type β buyer in trading only w_3 ex-post he gets $c_H - \Delta_H - \Delta_S - c_S$. By Assumption 1 (parts i, iii and iv), using (2) which implies that $\mu^{**} \geq \mu^*$, provided that $\mu_2 \geq \mu^{**} = \Delta_L/(\Delta_L + I)$, this is a profitable deviation for the type α buyer. Suppose then that $\mu_2 < \mu^{**}$. In this putative equilibrium the type β buyer gains a payoff of 0. If instead he deviates to pooling with the type α buyer and trades w_2 at $p_2 = c_L$ he obtains a payoff of $(1-\mu_2)\Delta_L - \mu_2 I$. Since $\mu_2 < \mu^{**}$, this is a profitable deviation for the type β buyer. ■

Lemma A.15*: Consider the model with a stochastic court, and any of the subgames following $\mathcal{C}$ choosing any feasible $\mathcal{F}$. Then it is not possible that in any equilibrium of such subgames the type α buyer does not invest and trade either w_1 or w_2, while the type β invests in and trades w_2.*

Proof: Recall that by Lemma A.12, in equilibrium the type β buyer trades w_3 for a price $p_3 = \Delta_S + c_S$ with positive probability.

Suppose that the outcome of the statement of the Lemma did obtain in some equilibrium. Then the payoff to the type α buyer would be 0 since he would unable to trade w_3 ex-post after separating at the contract offer stage.

Notice that if the type β buyer invests in and trades w_2 then it must be that $\mu_2 \leq \mu^{**}$, otherwise the type β buyer would obtain a negative payoff in equilibrium. Whenever $\mu_2 \leq \mu^{**}$, Assumption 1 (parts i and iii) implies that the type α buyer would obtain a positive payoff by deviating and pooling with the type β and investing and trading w_2. ■

Proof of Proposition 3: We deal separately with three different possible scenarios.

The first scenario is that of possible equilibria of subgames following the court's choice of $\mathcal{F}$ in which the type α buyer invests in and trades w_1. Therefore in this scenario the type β buyer trades w_3 at $p_3 = \Delta_S + c_S$ with probability 1. Using Lemma A.13 we know that in this scenario only two cases are possible. In equilibrium either the type β buyer invests in and trades w_2 and w_3, or the type β buyer only trades w_3 ex-post. Consider the first case. For this type of equilibrium to be viable we need the following two sets of conditions to be satisfied. The first set of conditions guarantee that both types of buyer are willing to make their respective investments. These are:

$$(1 - \mu_1)\Delta_M - \mu_1 I \geq 0 \tag{A.1}$$

$$(1 - \mu_2)\Delta_L - \mu_2 I \geq 0 \tag{A.2}$$

The second set of conditions guarantee that neither type of buyer wants to deviate from the separation that the equilibrium prescribes. These are:

$$(1 - \mu_1)\Delta_M - \mu_1 I \geq (1 - \mu_2)\Delta_H - \mu_2 I + c_H - \Delta_H - \Delta_S - c_S \tag{A.3}$$

and

$$(1 - \mu_2)\Delta_L - \mu_2 I \geq (1 - \mu_1)\Delta_N - \mu_1 I \tag{A.4}$$

Using Assumption 1 (part i) it is immediate to see that (A.2) implies (A.4). Therefore, we can safely ignore (A.4). The court's payoff in this type of equilibrium is given by

$$\frac{\Delta_M}{2} + \frac{\Delta_L}{2} + \frac{\Delta_S}{2} \tag{A.5}$$

Observe next that if any of the inequalities (A.1), (A.2), (A.3) are satisfied for a pair (μ_1, μ_2) then they will also be satisfied for any pair (μ_1', μ_2) with $\mu_1' \in [0, \mu_1)$. Therefore, choosing among the equilibria in this case, there is no loss in generality in assuming that the court would choose an $\mathcal{F}$ such that $\mu_1 = 0$, and a μ_2 that guarantees that (A.2) and (A.3) are satisfied. For these two inequalities to be both satisfied we need μ_2 to be such that

$$\frac{c_H - \Delta_H - \Delta_S - c_S}{\Delta_H + I} = \mu^* \leq \mu_2 \leq \mu^{**} = \frac{\Delta_L}{\Delta_L + I} \tag{A.6}$$

It follows from Assumption 1 (parts i and iii) that whenever I satisfies the inequality in (2), then μ^* $< \mu^{**}$, so that the range in (A.6) is not empty. Therefore the court's payoff in this case is maximized by setting $\mathcal{F} = (0, \mu)$ where $\mu \in [\mu^*, \mu^{**}]$.

Consider now the second case in the first scenario. Recall that in this type of equilibrium the type β buyer does not invest in and trade w_2. It follows that for this type of equilibrium to be viable we must have that

$$(1 - \mu_2)\Delta_L - \mu_2 I \leq 0 \tag{A.7}$$

since otherwise he would find it profitable to deviate and trade w_2 at $p_2 = c_L$. For this type of equilibrium to be viable we also need (A.1) to be satisfied, as well as conditions that guarantee that neither type of buyer wants to deviate from the separation that the equilibrium prescribes. These are

$$(1 - \mu_1)\Delta_M - \mu_1 I \geq c_H - \Delta_H - \Delta_S - c_S \tag{A.8}$$

and

$$0 \geq (1 - \mu_1)\Delta_N - \mu_1 I \tag{A.9}$$

The court's payoff in this type of equilibrium is given by

$$\frac{\Delta_M}{2} + \frac{\Delta_S}{2} \tag{A.10}$$

Observe next that if any of the inequalities (A.1), (A.7), (A.8), (A.9) are satisfied for a pair (μ_1, μ_2) then they will also be satisfied for any pair (μ_1', μ_2) with $\mu_1' \in [0, \mu_1)$. Therefore, choosing among the equilibria in this case, there is no loss in generality in assuming that the court would choose an $\mathcal{F}$ such that $\mu_1 = 0$, and a μ_2 that guarantees that (A.7) is satisfied. For this inequality to be satisfied we need μ_2 to be such that

$$\mu_2 \geq \mu^{**} = \frac{\Delta_L}{\Delta_L + I} \tag{A.11}$$

Therefore the court's payoff in this case is maximized by setting $\mathcal{F} = (0, \mu_2)$ with $\mu_2 \in [\mu^{**}, 1]$.

The second scenario we analyze is that of possible equilibria of subgames following the court's choice of $\mathcal{F}$ in which the type α buyer invests in and trades w_2. From Lemma A.14 we know that it must be that the type β buyer pools with the type α buyer in trading w_2 at $p_2 = c_L$ and trades w_3 ex-post at $p_3 = \Delta_S + c_S$ with probability 1.

For this type of equilibrium to be viable we need the following two sets of conditions to be satisfied. The first set of conditions guarantee that both types of buyer are willing to make their respective investments. These are:

$$(1-\mu_2)\Delta_H - \mu_2 I + c_H - \Delta_H - \Delta_S - c_S \geq 0 \tag{A.12}$$

$$(1-\mu_2)\Delta_L - \mu_2 I \geq 0 \tag{A.13}$$

The second set of conditions guarantee that neither type of buyer wants to deviate from the pooling that the equilibrium prescribes. Assuming that after a deviation the type α buyer is believed to be type α, which is the worst case to consider in what follows, these are:

$$(1-\mu_2)\Delta_H - \mu_2 I + c_H - \Delta_H - \Delta_S - c_s \geq (1-\mu_1)\Delta_M - \mu_1 I \tag{A.14}$$

$$(1-\mu_2)\Delta_L - \mu_2 I \geq (1-\mu_1)\Delta_N - \mu_1 I \tag{A.15}$$

Notice that (A.14) implies that this type of equilibrium is viable only if

$$\mu_2 \leq \frac{c_H - \Delta_S - c_S - (1-\mu_1)\Delta_M + \mu_1 I}{\Delta_H + I} \tag{A.16}$$

The court's payoff in this type of equilibrium is given by

$$\frac{\Delta_H}{2} + \frac{\Delta_L}{2} + \frac{\Delta_S}{2} - \frac{\Delta_H}{2} = \frac{\Delta_L}{2} + \frac{\Delta_S}{2} \tag{A.17}$$

Observe next that if any of the inequalities (A.12), (A.13), (A.14) and (A.15) are satisfied for a pair (μ_1, μ_2) then they will also be satisfied for any pair (μ_1, μ_2') with $\mu_2' \in [0, \mu_2)$. Therefore, choosing among the equilibria in this case, there is no loss in generality in assuming that the court would choose an $\mathcal{F}$ such that $\mu_2 \in [0, \mu^*]$, and, since the right-hand side of (A.16) is monotonic increasing in μ_1, setting $\mu_1 = 0$. In this case the right-hand side of (A.16) coincides with μ^*.

The third scenario we analyze is that of possible equilibria of subgames following the court's choice of $\mathcal{F}$ in which the type α does not invest in and therefore does not trade either w_1 or w_2. From Lemmas A.13 and A.15 we know that in this scenario it must be the case that in equilibrium the type β buyer pools with the type α buyer. Clearly in this type of equilibrium both types of buyer trade w_3 ex-post at $p_3 = \Delta_S + c_S$.

For this type of equilibrium to be viable we need the following conditions to be satisfied. The first guarantees that the type β buyer does not want to deviate and invest in and trade w_2 (it is straightforward to check that he cannot profit from deviating and investing in and trading w_1). This condition reads

$$(1-\mu_2)\Delta_L - \mu_2 I \leq 0 \tag{A.18}$$

The other two conditions guarantee that the type α buyer does not want to deviate and invest in and trade either w_1 or w_2. These are:

$$c_H - \Delta_H - \Delta_S - c_S \geq (1-\mu_1)\Delta_M - \mu_1 I \tag{A.19}$$

and

$$c_H - \Delta_H - \Delta_S - c_S \geq (1-\mu_2)\Delta_H - \mu_2 I \tag{A.20}$$

Notice that (A.18) implies that this type of equilibrium is viable only if

$$\mu_2 \geq \mu^{**} = \frac{\Delta_L}{\Delta_L + I} \tag{A.21}$$

By Assumption 1 (parts i, iii and iv), using (2), if (A.21) holds then (A.20) is also satisfied. Using (A.19) we can then conclude that this type of equilibrium is viable only if (A.21) holds together with

$$\mu_1 \geq \frac{\Delta_M + \Delta_H + \Delta_S - c_H + c_S}{\Delta_M + I} \tag{A.22}$$

The court's payoff in this type of equilibrium is given by

$$\frac{\Delta_S}{2} - \frac{\Delta_H}{2} \tag{A.23}$$

We can now compare the three scenarios to complete the proof of the proposition. Comparing the court's payoff in the two cases of the first scenario and in the second and third scenario, as given by (A.5), (A.10), (A.17) and (A.23) it is clear that the court's payoff is highest in the first case of the first scenario. Recall that in this equilibrium the court sets $\mathcal{F} = (0, \mu)$ where $\mu \in [\mu^*, \mu^{**}]$.

To conclude the proof we need to argue that the second case of the first scenario as well as the second and third scenarios are ruled out when $\mathcal{F} = (0, \mu)$ where $\mu \in [\mu^*, \mu^{**}]$.

To see that an equilibrium of the type in the second case of the first scenario is ruled out notice that by Assumption 1 (parts i and iii), using (2), (A.11) is not compatible with $\mu \in [\mu^*, \mu^{**})$. We can then show that there does not exists an equilibrium of the game with a stochastic court where the court sets $\mathcal{F} = (0, \mu^{**})$ and the parties behave as in the equilibrium of the type in the second case of the first scenario. Assume by way of contradiction that such an equilibrium exists. Then the court's payoff is specified in (A.10). In this case, however, the court has a profitable deviation, by deviating and choosing $\mathcal{F} = (0, \mu)$ with $\mu \in [\mu^*, \mu^{**})$ the court can achieve the higher payoff in (A.5).

To see that an equilibrium of the type in the second scenario is ruled out notice that the payoff in (A.17) is not compatible with $\mu \in (\mu^*, \mu^{**}]$. We can then show that there does not exists an equilibrium of the game with a stochastic court where the court sets $\mathcal{F} = (0, \mu^*)$ and the parties behave as in the equilibrium of the type in the second scenario. Assume by way of contradiction that such an equilibrium exists. Then the court's payoff is specified in (A.17). In this case, however, the court has a profitable deviation, by deviating and choosing $\mathcal{F} = (0, \mu)$ with $\mu \in (\mu^*, \mu^{**}]$ the court can achieve the higher payoff in (A.5).

To see that an equilibrium of the type in the third scenario is ruled out notice that the payoff in (A.23) is not compatible with $\mu \in [\mu^*, \mu^{**})$. We can then show that there does not exists an equilibrium of the game with a stochastic court where the court sets $\mathcal{F} = (0, \mu^{**})$ and the parties behave as in the equilibrium of the type in the third scenario. Assume by way of contradiction that such an equilibrium exists. Then the court's payoff is specified in (A.23). In this case, however, the court has a profitable deviation, by deviating and choosing $\mathcal{F} = (0, \mu)$ with $\mu \in [\mu^*, \mu^{**})$ the court can achieve the higher payoff in (A.5). ■

References

Adler, B. E. (1999): "The Questionable Ascent of Hadley v. Baxendale," University of California, Berkeley. Olin Program in Law & Economics. Working Paper No. 25.

Anderlini, L., L. Felli, and A. Postlewaite (2006): "Active Courts and Menu Contracts," Georgetown University, *mimeo.*

——— (2007): "Courts of Law and Unforeseen Contingencies," *Journal of Law, Economics, & Organization*, forthcoming.

Ayres, I., and R. Gertner (1989): "Filling Gaps in Incomplete Contracts: An Economic Theory of Default Rules," *Yale Law Journal*, 87.

Baliga, S., L. C. Corchon, and T. Sjöström (1997): "The Theory of Implementation When the Planner Is a Player," *Journal of Economic Theory*, 77, 15–33.

Bebchuk, L., and S. Shavell (1991): "Information and the Scope of Liability for Breach of Contract: The Rule of Hadley V. Baxendale," *Journal of Law, Economics & Organization*, 7, 284–312.

Bernheim, D., and M. Whinston (1998): "Incomplete Contracts and Strategic Ambiguity," *American Economic Review*, 88, 902–932.

Bond, P. (2003): "Contracting in the Presence of Judicial Agency," Northwestern University. *Mimeo.*

Cho, I.-K., and D. M. Kreps (1987): "Signaling Games and Stable Equilibria," *Quarterly Journal of Economics*, 102, 179–221.

Fudenberg, D., and J. Tirole (1991): "Perfect Bayesian Equilibrium and Sequential Equilibrium," *Journal of Economic Theory*, 53, 236–260.

Kreps, D., and R. Wilson (1982): "Sequential Equilibria," *Econometrica*, 50, 863–894.

LEVY, G. (2005): "Careerist Judges and the Appeals Process," *Rand Journal of Economics*, 36, 275–297.

MASKIN, E. (2005): "On the Rationale for Penalty Default Rules," Institute for Advanced Study. *Mimeo.*

MASKIN, E., AND J. TIROLE (1990): "The Principal Agent Relationship with an Informed Principal, I: Private Values," *Econometrica*, 58, 379–409.

——— (1992): "The Principal Agent Relationship with an Informed Principal II: Common Values," *Econometrica*, 60, 1–42.

——— (1999): "Unforseen Contingencies and Incomplete Contracts," *Review of Economic Studies*, 66, 83–114.

MOORE, J., AND R. REPULLO (1988): "Subgame Perfect Implementation," *Econometrica*, 56, 1191–1220.

POSNER, E. (1998): "The Parol Evidence Rule, The Plain Meaning Rule, and the Principles of Contractual Interpretation," *University of Pennsylvania Law Review*, 146, 533–577.

SHAVELL, S. (2006): "On the Writing and Interpretation of Contracts," *Journal of Law, Economics, & Organization*, 22, 289–314.

USMAN, K. (2002): "Verifiability and Contract Enforcement: A Model with Judicial Moral Hazard," *Journal of Law, Economics & Organization*, 18, 67–94.