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**INTEGRATING AN AGREEMENT TO
INDUCE INFORMATION DISCLOSURE**

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Integrating an Agreement to Induce Information Disclosure*

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Abstract

By integrating a written agreement, contracting parties can disallow certain types of extrinsic evidence from being introduced at trial. I examine the role played by the parol evidence rule and integration in an asymmetric information environment. I demonstrate that integration allows an uninformed party to better induce information disclosure from an informed party by penalizing non-disclosure and limiting ex post opportunistic behavior. I also show that while the uninformed party will always prefer integration, welfare may be lower with integration.

1 Introduction

When contracting parties integrate their written agreement, the parol evidence rule bars them from introducing extrinsic evidence at trial that (1) is prior to or contemporaneous with the written agreement and (2) is inconsistent with the written terms.¹ Previous research has identified the costs and benefits of the parol evidence rule in a symmetric information environment.² Integration, e.g., through a merger clause, allows the parties to reduce the cost of litigation (and judicial error) by limiting the scope of evidence that can be introduced at trial.³ On the other hand, integration can potentially prevent the parties from ex post completing the contract, i.e., filling the gaps, by disallowing potentially relevant evidence. If the reduction of litigation cost is larger than the potential loss of relevant evidence, parties will integrate. If not, they will not integrate. The existing theory thus postulates that symmetrically informed parties will make a cost-benefit calculus in deciding whether to integrate their agreement.

This paper attempts to examine how the parol evidence rule and integration can affect information disclosure at the time of contract formation. More precisely, when parties are not symmetrically informed at the time of entering into a contract, can the parol evidence

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rule and integration induce them to disclose their private information? As is well known, asymmetric information can prevent parties from writing a complete, state-contingent contract because an informed party has an incentive to leverage her informational advantage to obtain a better contractual return.⁴ The main thesis of the paper is that an uninformed party can provide better incentive to an informed party to disclose information through integration. A starting observation is that when an agreement is integrated, the informed party cannot present previously undisclosed information as evidence at trial against the uninformed party. Integration can work as a penalty against non-disclosure, and the uninformed party can more easily elicit information from the informed party with integration.

As an illustration, the paper posits a scenario where a seller enters into a contract with a buyer to sell a unit of widget. The model assumes that there are two types of buyer: generic and special. A generic buyer will use the widget for ordinary purposes and, in case the widget is defective, the consequence of such breach (e.g., loss of profit or damage) is relatively small. On the other hand, a special buyer uses the widget for non-ordinary purposes and, if the widget is defective, the consequential loss from the breach is much larger. At the time of entering into the contract, the seller and the buyer can negotiate over the warranty provision. For the generic buyer, limited warranty will be sufficient, and for that, the seller can charge a relatively low price. For the special buyer, however, the buyer would want a more extended warranty term. Since the seller will also have to take more costly precaution to deliver a non-defective widget to the special buyer, the seller would want to charge a higher price.

If the seller can distinguish between the two types of buyer, she can offer contract terms in accordance: a low price with limited warranty for the generic buyer and a high price with full warranty for the special buyer. If, on the other hand, the seller cannot distinguish among the types, will the seller be able to provide tailored service? That, of course, depends on the buyer's incentive to disclose his type (information) to the seller, and the incentive to disclose again depends on the sanctity of the written agreement, i.e., whether either party can, ex post, introduce extrinsic evidence that may (potentially) be inconsistent with the written terms of the contract. The special buyer, even though he would like to obtain a full warranty, is concerned about having to pay a high price. This concern can be severe if, by disclosing that he is a special buyer, the seller can extract more rent from him.

If the contract the buyer signs with the seller is not integrated, even if the contract, by default or expressly, stipulates limited warranty, the buyer may be able to opportunistically introduce extrinsic evidence⁵ at trial to prove to the court that the seller had "orally" promised him full warranty.⁶ Conversely, even if the special buyer had signed a full warranty contract with a higher price, the seller can, ex post, opportunistically argue that the buyer had "orally" waived full warranty.⁷ This dual incentive encourages the special buyer to sign the generic contract, with limited warranty and a low price, and argue for full warranty after the seller's breach. It also makes it more difficult for the seller to separate among the types by offering a menu of contracts. If the agreements are fully integrated, on the other

hand, the special buyer can no longer have the best of both worlds by paying a low price for limited warranty and arguing, *ex post*, for full warranty. Similarly, the seller cannot provide full warranty on a written agreement and opportunistically argue limited warranty *ex post*. With integration, the special buyer has more incentive to pay the higher price for full warranty and it becomes easier for the seller to distinguish between types.

The paper is organized as follows. In the next section, we present a full model of contract formation between an uninformed seller and an informed buyer, where the seller makes a take-it-or-leave-it offer to the buyer. The seller can offer either one contract for both types of buyer to accept (pooling equilibrium) or a menu of contracts for the buyer to self-select (separating equilibrium). If the seller offers only one contract, the buyer's information (type) is not revealed, whereas if the buyer self-selects based on his type, the seller induces information disclosure from the buyer. The model demonstrates that when the agreements are integrated, the seller is more likely to induce a separating equilibrium. The section also demonstrates that, regardless of the type of equilibrium she is in, the seller always prefers to integrate, but welfare may actually be higher without integration. The last section concludes with observations for future research.

2 The Model

A buyer and a seller enter into a contract for the seller to produce and deliver a widget to the buyer. Both are risk-neutral profit-maximizers. There are two types ($\{h, l\}$) of buyers who places value $v \in \{v_h, v_l\}$ on the widget, where $v_h > v_l \gg 0$. The probability that the buyer will be of type h is r where $1 > r > 0$. We assume that seller delivering a non-defective (or conforming) widget to the buyer is not a certain event, but the seller can make unobservable investment, $i \in [0, \infty)$, to decrease the chance of delivering a defective (non-conforming) widget. If we let $q(i)$ be the probability of delivering a conforming widget, we assume $0 < q(i) < 1 \forall i$, $q'(i) > 0$, $q''(0) \gg 0$, and $q''(i) < 0$. At the same time, investment is costly for the seller: $c(i) \geq 0 \forall i$ where $c'(i) > 0$, $c'(0) = 0$, and $c''(i) > 0$. Investment has a diminishing marginal return and an increasing marginal cost. The buyer realizes the value (v) only when the seller delivers a non-defective widget, and if the seller delivers a defective widget, the buyer realizes zero revenue.

The timing of the game is as follows. At $t = 1$, the nature selects the buyer's value which is observed only by the buyer. At $t = 2$, the seller makes a take-it-or-leave-it offer to the buyer and the buyer either accepts or rejects. The contract (k) contains a price (p) and a liability (or warranty) provisions (w) and can contain a merger clause ($m \in \{i, n\}$): $k = (p, w, m)$. We assume that the seller's investment choice is not observable. Liability can be either limited or unlimited: $w \in \{u, l\}$. If limited, the seller's liability for breach is capped at v_l . If unlimited (or full), the seller will be liable for upto v_h . The seller can offer a menu of contracts with different liability provisions ((p_h, u, m) and (p_l, l, m)), to the buyer for the buyer to self-select (separating equilibrium) or the seller can offer only one contract

(pooling equilibrium) for both types of buyer. We assume that $1 - r$ is sufficiently large so that she does not have an incentive to serve only the h -type buyer. We also assume that if the buyer rejects, the buyer realizes zero profit (his reservation profit) and if the buyer accepts, he immediately pays the contract price.

At $t = 3$, the seller chooses the level of investment based on her knowledge of the buyer's type and potential liability in case she fails to deliver a conforming widget. At $t = 4$, the seller delivers a conforming widget with probability $q(i)$. If she delivers a conforming widget, the buyer accepts delivery and the game ends. If the seller delivers a non-conforming widget, the buyer rejects the delivery and they proceed to $t = 5$, where costless litigation takes place. At litigation, although the court accurately determines the buyer's value, the buyer and the seller can attempt to present extrinsic (oral) evidence on whether or not the seller has offered full warranty to the buyer.⁸ Whether they can do so depends on whether they have integrated the written agreement at $t = 2$. If they have integrated the agreement ($m = i$), neither side can present extrinsic evidence that is contrary to the express terms of the contract. If they have not integrated ($m = n$), however, even though the express contract stipulates, for instance, limited liability, the buyer can (opportunistically) present extrinsic evidence to the contrary. We assume that the party who presents evidence that is consistent with the express terms of the contract wins with probability $\frac{1}{2} \leq \alpha < 1$.⁹

2.1 The First Best

If the social planner were to choose the level of investment with full information, the first best level of investment requires the seller to choose (i_h, i_l) to maximize

$$SW = r(q(i_h)v_h - c(i_h)) + (1 - r)(q(i_l)v_l - c(i_l)).$$

This produces the first order conditions of $q'(i_h^*)v_h = c'(i_h^*)$ and $q'(i_l^*)v_l = c'(i_l^*)$ where $i^* = (i_h^*, i_l^*)$ denote the first-best levels of investment. The assumptions on q and c imply that $i_h^* > i_l^* > 0$: the seller should make more investment to deliver a conforming widget for the h -type than for the l -type. Similarly, if the seller can observe the buyer's type and there is no ex post dispute over contract, the seller will offer a tailored contract: for the h -type, the seller offers $k_h = (p = v_h, w = u)$, and for the l -type, the seller offers $k_l = (p = v_l, w = l)$. In both cases, the buyer accepts. The seller chooses (i_h, i_l) to maximize

$$\pi_s = r(v_h - (1 - q(i_h))v_h - c(i_h)) + (1 - r)(v_l - (1 - q(i_l))v_l - c(i_l)).$$

This produces the first order conditions of $q'(i_h)v_h = c'(i_h)$ and $q'(i_l)v_l = c'(i_l)$, which are identical to the ones that maximize the social welfare. When the seller is symmetrically informed, just like a monopolist who can first-price-discriminate among consumers, the seller extracts all the surplus from the buyer and, at the same time, maximizes welfare.

2.2 When an Agreement is Not Integrated

When an agreement is not integrated, either side can introduce extrinsic evidence at trial even if such evidence may be contrary to the express written terms. For the h -type buyer, this implies that even if he had signed a contract with limited liability, after the seller delivers a defective widget, the buyer can argue that the seller had orally promised him full liability (and modified the express terms). Conversely, for the seller, even if the h -type buyer had signed a contract with full liability, she can argue, after delivering a non-conforming widget, that the buyer had waived full liability. Whether the seller offers one or two contracts to the buyer, she will have to take both of these incentive effects into account in designing the contract and making her investment.

Lemma 1 *When an agreement is not integrated, in a pooling equilibrium, the seller makes an investment that is too high for the l -type and too low for the h -type. In a separating equilibrium, the seller makes optimal investment for the h -type but too little investment for the l -type.*

When the seller offers one contract for both types of buyer to choose, even though the (unintegrated) contract comes with limited liability, the seller is aware that the h -type buyer can and will argue, ex post, that the seller had promised him full warranty. Since this raises her expected liability from breach above v_l , she will raise her level of investment to minimize this expected liability. This implies that for the l -type buyer, the seller is investing too much. When the seller offers a menu of contracts for the buyer, the conventional adverse selection dynamic applies. Although she makes the optimal level of investment for the h -type, because the h -type receives informational rent (which depends on the amount of investment for the l -type), in order to reduce this rent, the seller lowers the level of investment for the l -type in equilibrium. Inefficiency is with respect only to the l -type.

2.3 When an Agreement is Integrated

If the agreement is fully integrated, neither side can present any extrinsic evidence that is contrary to the express terms of the agreement. If the contract stipulates limited liability ($w = l$), the h -type buyer cannot introduce extrinsic evidence at trial to argue that the seller has (orally) guaranteed him full warranty. Conversely, if the contract stipulates full warranty ($w = u$), the seller cannot introduce extrinsic evidence at trial to argue that the buyer has (orally) waived the full warranty provision. With no extrinsic evidence to the contrary, the court always enforces the express terms of the contract. In the model, the seller's program is identical to that without integration except for the fact that, now, $\alpha = 1$.

Lemma 2 *When an agreement is integrated, in a pooling equilibrium, the seller makes an investment that is optimal for the l -type and too low for the h -type. In a separating equilibrium, the seller makes optimal investment for the h -type but too little investment for the l -type.*

For the pooling equilibrium, when the seller offers $k = (p_l = v_l, w = l, m = i)$ and both types of buyer accept, in contrast to the case without integration, the seller no longer needs to worry about the h -type buyer's potential opportunistic behavior ex post. The seller's liability will be fixed at v_l and she can make her investment in accordance, which is optimal for the l -type but sub-optimal for the h -type. In a separating equilibrium, while the conventional trade-off between reducing the h -type's informational rent and reducing the l -type's inefficiency applies, because the ex post opportunistic incentives (of the seller and the h -type buyer) are absent, it becomes easier for the seller to separate the types.

2.4 Comparison between Integration and Non-integration

In this sub-section, we examine the seller's incentive over integration and over inducing the buyer to disclose his information. Foremost, we ask whether the seller always benefits (makes more profit) by integrating the agreement than not. Although non-integration leaves the seller susceptible for the h -type buyer's ex post opportunism, it also allows the seller a chance to lower her expected liability. Second, we examine whether the seller is more likely to induce the buyer to reveal his information with integration than without. This involves comparing the seller's profit under pooling versus separating equilibrium. Finally, we examine which regime engenders lower inefficiency and whether such social objective coincides with the seller's private incentive to integrate. Private and social incentives may diverge in this case because while the seller cares about the amount of rent left to the buyer, from the social welfare perspective, that imposes no loss in efficiency.

Proposition 1 *In both types of equilibrium, the seller makes more profit when an agreement is integrated than when it is not. Seller is also more likely to separate the buyer's types by offering a menu of contracts when an agreement is integrated than when it is not.*

When the seller offers only one contract, the seller makes more profit when the agreement is integrated than when it is not, because while the seller charges the same price, $p = v_l$, in both cases, the seller's liability is higher without the integration. The higher liability without integration also means that the seller has to make more investment in an attempt to minimize that liability. When the seller offers a menu of agreements, integrating the agreements is also more advantageous for the seller. The reason is that without integration, even though the h -type buyer has chosen the full warranty contract, the seller cannot commit not to present contrary extrinsic evidence ex post. This, in effect, reduces the h -type buyer's

willingness to pay for the full warranty contract and also the maximum price the seller can charge for the full warranty contract. Even though the h -type's true reservation value v_h , his de facto reservation value is lower, and the seller cannot charge more than the de facto reservation value.

Integration also helps the seller better able to distinguish between the types. In a pooling equilibrium, the seller's profit can be written as $\pi_s^p = SW(i_p) - r\pi_h(i_p)$. In other words, conditional on investment, the seller attempts to maximize the social welfare minus the h -type's profit, his "informational rent." When the agreement is integrated, because the h -type can no longer engage in ex post opportunistic behavior, his profit decreases. This, in turn, allows the seller to decrease the investment level. The reduction in investment, however, has two offsetting effects. While it increases the total surplus for the l -type (since, now, the investment is closer to the first best), it decreases the total surplus with respect to the h -type (the investment level moves further away from the first best).

In a separating equilibrium, the seller's profit can also be written as $\pi_s^s = SW(i_h, i_l) - r\pi_h(i_l)$. Although, as in the pooling equilibrium, the seller is attempting to maximize the social welfare minus the h -type's informational rent, the difference is that attempting to reduce the h -type's informational rent, by changing i_l , does not entail an efficiency loss for both types. Because the seller makes optimal investment for the h -type, integrating the agreements allows the seller to adjust the investment level only for the l -type and increase her profit. In short, in a separating equilibrium, the seller's response (to integration) is more tailored and accurate while in a pooling equilibrium, it is more blunt. Therefore, the seller is more likely to separate the types with integration than without.

Proposition 2 *Conditional on the type of equilibrium, the seller makes a more efficient level of investment when an agreement is not integrated than when it is. Social welfare, however, may be higher or lower with integration.*

In a pooling equilibrium, the seller, by offering limited liability and integrating the agreement, is able to ignore the h -type altogether and make an investment that is tailored only for the l -type. When the agreement is not integrated, due to potential ex post liability exposure, the seller had to make a higher level of investment. Because maximizing the social welfare dictates the seller to make an interim level investment, non-integration produces a better investment outcome than integration. In a separating equilibrium, the seller was able to induce the h -type to choose the full warranty contract by reducing the level of investment for the l -type (i_l). The more she reduced i_l , the easier it was for the seller to separate the types. At the same time, reducing i_l creates an inefficiency and welfare loss. When the agreement is not integrated, because it is more difficult for the seller to separate the types, she had less of an incentive to reduce i_l . Hence, the seller makes more investment for the l -type when the agreements are not integrated than when they are, yielding a higher equilibrium welfare.

Whether integration leads to a higher social welfare is ambiguous. There are two opposite forces in effect. We know that information disclosure is more likely when the seller integrates the agreements than when she does not. However, as shown above, integration also allows the seller to more effectively reduce the h -type buyer's profit (and increase her profit) either by reducing the level of investment for the l -type (in a separating equilibrium) or by reducing the average level of investment (in a pooling equilibrium). This distorts the equilibrium investment further away from the first best level and reduces welfare. Whether or not the social welfare will increase from integration, therefore, depends on the relative sizes of these two opposing effects. If an increase in welfare from better information disclosure is larger than a decrease in welfare from investment distortion, welfare will go up. If not, welfare will decrease. From the model, a more accurate comparison cannot be made unless we make more specific, potentially unrealistic, assumptions.

3 Conclusion

This paper has argued that by integrating an agreement and excluding inconsistent extrinsic evidence, parties can minimize ex post opportunistic behavior and provide better incentive to disclose information at the time of contract formation. In particular, integration prohibits an informed party from introducing her private information ex post to affect the terms of a written contract. Uninformed party can use integration (and the parol evidence rule) as a tool in providing better incentive to the informed party to disclose her private information ex ante. Although integration does not always lead to full disclosure, it makes disclosure more likely. The paper has also shown that the uninformed party always prefers integration over non-integration, but the uninformed party makes better investment decision without integration. Social welfare with respect to integration, therefore, is ambiguous.

In the model, when an agreement is unintegrated, either party can present extrinsic (oral) evidence that contradicts an explicit writing. For instance, even if a writing limits the seller's liability from breach, when the agreement is not integrated, the buyer could attempt to introduce extrinsic evidence at trial to argue full liability. This conception of the parol evidence rule is fairly narrow, since the rule also governs extrinsic evidence that is not inconsistent but additional to the written terms of the contract. Whether or not such additional terms can be introduced at trial depends on the level of integration, a subject that is analyzed in the paper. The paper also does not examine other sources of (in)efficiency, such as the cost and benefit of completing an unintegrated contract through ex post adjudication. Future research can take some of these factors into account for a more complete examination of the parol evidence rule.

Proofs

Proof of Lemma 1. When the seller offers a pooling contract, she offers $k = (v_l, l, n)$. The seller's ex ante profit is

$$\pi_s = r\{v_l - (1 - q(i))(\alpha v_l + (1 - \alpha)v_h)\} + (1 - r)\{v_l - (1 - q(i))v_l\} - c(i).$$

The maximization with respect to i yields the first order condition of

$$q'(i_p^{w/o})\{r(\alpha v_l + (1 - \alpha)v_h) + (1 - r)v_l\} = c'(i_p^{w/o})$$

The variable $i_p^{w/o}$ stands for the seller's equilibrium investment in pooling equilibrium (p) without an integration clause (w/o). Since $v_h > r(\alpha v_l + (1 - \alpha)v_h) + (1 - r)v_l > v_l$, $i_h^* > i_p^{w/o} > i_l^*$.

Now suppose the seller offers a menu of contracts to the buyer: $k_h = (p_h, u, n)$ and $k_l = (p_l, l, n)$. For the h -type buyer to choose k_h , the contract terms must satisfy

$$q(i_h)v_h + (1 - q(i_h))(\alpha v_h + (1 - \alpha)v_l) - p_h \geq q(i_l)v_h + (1 - q(i_l))(\alpha v_l + (1 - \alpha)v_h) - p_l \quad (IC_h)$$

On the left hand side, even though the express terms of the contract stipulates full warranty, the seller can (opportunistically) introduce extrinsic evidence to the contrary. On the right hand side, the h -type buyer, who has accepted k_l , introduces extrinsic evidence at trial to prove that the seller has (orally) guaranteed full warranty.

For the l -type buyer to choose k_l ,

$$q(i_l)v_l + (1 - q(i_l))v_l - p_l \geq q(i_h)v_l + (1 - q(i_h))v_l - p_h \quad (IC_l)$$

Finally, for both types to accept either contract rather than reject,

$$q(i_h)v_h + (1 - q(i_h))(\alpha v_h + (1 - \alpha)v_l) - p_h \geq 0. \quad (IR_h)$$

and

$$q(i_l)v_l + (1 - q(i_l))v_l - p_l \geq 0. \quad (IR_l)$$

The seller's expected profit with separation is

$$\pi_s = r\{p_h - (1 - q(i_h))(\alpha v_h + (1 - \alpha)v_l) - c(i_h)\} - (1 - r)\{p_l - (1 - q(i_l))v_l - c(i_l)\}.$$

The seller maximizes π_s subject to constraints (IC_h, IR_l, IC_l, IR_h) .

In equilibrium, the constraints IC_h and IR_l bind but IC_l and IR_h do not. Since the constraint IR_l binds, the l -type buyer, in equilibrium, makes no more than his outside

option. On the other hand, since IR_h does not bind, the h -type buyer receives a profit. From binding IR_l we get $p_l = v_l$. From binding IC_h , we get

$$p_h = \{q(i_h)v_h + (1 - q(i_h))(\alpha v_h + (1 - \alpha)v_l)\} - \{q(i_l)v_h + (1 - q(i_l))(\alpha v_l + (1 - \alpha)v_h)\} + p_l$$

The seller's profit, with some simplification, reduces to

$$\pi_s = r\{q(i_h)v_h - c(i_h) - [q(i_l)v_h + (1 - q(i_l))(\alpha v_l + (1 - \alpha)v_h) - v_l]\} - (1 - r)\{q(i_l)v_l - c(i_l)\}.$$

Note that the expression $q(i_l)v_h + (1 - q(i_l))(\alpha v_l + (1 - \alpha)v_h) - v_l$ represents the h -type buyer's equilibrium profit (π_h), or the buyer's informational rent, so the seller's profit can be rewritten as

$$\pi_s = SW(i_h, i_l) - r\pi_h(i_l).$$

When the seller maximizes the profit with respect to (i_h, i_l) ,

$$\begin{aligned} q'(i_h^{w/o})v_h &= c'(i_h^{w/o}) \\ q'(i_l^{w/o})v_l &= c'(i_l^{w/o}) + \frac{r}{1-r}q'(i_l^{w/o})\alpha(v_h - v_l) \end{aligned}$$

Given the assumptions on q and c , $i_h^{w/o} = i_h^*$ and $i_l^{w/o} < i_l^*$. ■

Proof of Lemma 2. If the seller were to serve both types of buyer with only one type of contract, she offers $k = (p_l = v_l, w = l, m = i)$ and both types of buyer accept. Given that the h -type buyer cannot argue, at trial, that the seller promised him full liability by introducing extrinsic evidence, the seller's ex ante profit is

$$\pi_s = v_l - r\{(1 - q(i))v_l\} - (1 - r)\{(1 - q(i))v_l\} - c(i).$$

The maximization yields

$$q'(i_p^w)v_l = c'(i_p^w)$$

Compared to the first best, the seller's investment is optimal for the l -type but suboptimal for the h -type: $i_h^* > i_p^w = i_l^*$.

If the seller were to offer a menu of contracts, $k_h = (p_h, u, i)$ and $k_l = (p_l, l, i)$, the new constraints are

$$\begin{aligned} q(i_h)v_h + (1 - q(i_h))v_h - p_h &\geq q(i_l)v_h + (1 - q(i_l))v_l - p_l && (IC_h) \\ q(i_l)v_l + (1 - q(i_l))v_l - p_l &\geq q(i_h)v_l + (1 - q(i_h))v_l - p_h && (IC_l) \\ q(i_h)v_h + (1 - q(i_h))v_h - p_h &\geq 0 && (IR_h) \\ q(i_l)v_l + (1 - q(i_l))v_l - p_l &\geq 0 && (IR_l) \end{aligned}$$

The seller's expected profit is

$$\pi_s = r\{p_h - (1 - q(i_h))v_h - c(i_h)\} - (1 - r)\{p_l - (1 - q(i_l))v_l - c(i_l)\}.$$

As before, in equilibrium, the constraints IC_h and IR_l bind but IC_l and IR_h do not, so that

$$\begin{aligned} p_l &= v_l \\ p_h &= (1 - q(i_l))(v_h - v_l) + p_l \end{aligned}$$

The first order conditions are

$$\begin{aligned} q'(i_h^w)v_h &= c'(i_h^w) \\ q'(i_l^w)v_l &= c'(i_l^w) + \frac{r}{1-r}q'(i_l^w)(v_h - v_l) \end{aligned}$$

Similar to the case without integration, $i_h^w = i_h^*$ and $i_l^w < i_l^*$. ■

Proof of Proposition 1. When there is no integration, the seller's expected profits in pooling and separating equilibria are

$$\pi_s^p = r\{v_l - (1 - q(i_p^{w/o}))(\alpha v_l + (1 - \alpha)v_h)\} + (1 - r)\{v_l - (1 - q(i_p^{w/o}))v_l\} - c(i_p^{w/o})$$

and

$$\begin{aligned} \pi_s^s = r\{q(i_h^{w/o})v_h - c(i_h^{w/o}) - [q(i_l^{w/o})v_h + (1 - q(i_l^{w/o}))(\alpha v_l + (1 - \alpha)v_h) - v_l]\} \\ - (1 - r)\{q(i_l^{w/o})v_l - c(i_l^{w/o})\} \end{aligned}$$

respectively. When differentiated with respect to α , we get

$$\frac{\partial \pi_s^p}{\partial \alpha} = r(1 - q(i_p^{w/o}))(v_h - v_l) > 0$$

and

$$\frac{\partial \pi_s^s}{\partial \alpha} = r(1 - q(i_l^{w/o}))(v_h - v_l) > 0$$

Note that because $\frac{\partial \pi_s^j}{\partial i_k} = 0$ at optimum, we can ignore all terms such as $\frac{\partial i_j^{w/o}}{\partial \alpha}$. Since $i_p^{w/o} > i_l^* > i_l^{w/o}$, $(1 - q(i_p^{w/o})) < (1 - q(i_l^{w/o}))$ and $\frac{\partial \pi_s^s}{\partial \alpha} > \frac{\partial \pi_s^p}{\partial \alpha}$. Therefore, the seller is more likely to separate the types (induce the buyer to disclose information) with integration than without. ■

Proof of Proposition 2. When both types of buyer are pooled, (informationally constrained) social welfare is given by

$$SW_p = q(i)\{rv_h + (1 - r)v_l\} - c(i)$$

Maximization yields

$$q'(i_p^*)\{rv_h + (1 - r)v_l\} = c'(i_p^*)$$

Without integration, the seller's investment level is given by

$$q'(i_p^{w/o})\{r(\alpha v_l + (1 - \alpha)v_h) + (1 - r)v_l\} = c'(i_p^{w/o})$$

whereas with integration,

$$q'(i_p^w)v_l = c'(i_p^w)$$

Since $1 > \alpha > 0$, $\{rv_h + (1 - r)v_l\} > r(\alpha v_l + (1 - \alpha)v_h) + (1 - r)v_l > v_l$, which implies that $i_p^* > i_p^{w/o} > i_p^w$. Therefore, in pooling equilibrium, non-integration produces higher social welfare than integration.

When the buyer types are separated, (unconstrained) social welfare is given by

$$SW_s = r(q(i_h)v_h - c(i_h)) + (1 - r)(q(i_l)v_l - c(i_l))$$

which is maximized by choosing $i^* = (i_h^*, i_l^*)$ that satisfy $q'(i_h^*)v_h = c'(i_h^*)$ and $q'(i_l^*)v_l = c'(i_l^*)$. We know that $i_h^* = i_h^w = i_h^{w/o}$. For the l -type, without integration, $i_l^{w/o}$ is chosen to satisfy

$$q'(i_l^{w/o})v_l = c'(i_l^{w/o}) + \frac{r}{1 - r}q'(i_l^{w/o})\alpha(v_h - v_l)$$

whereas, with integration,

$$q'(i_l^w)v_l = c'(i_l^w) + \frac{r}{1 - r}q'(i_l^w)(v_h - v_l)$$

Assumptions on q and c imply that $i_l^* > i_l^{w/o} > i_l^w$. Therefore, non-integration produces higher social welfare than integration in a separating equilibrium.

If the type equilibrium does not depend on whether or not the agreements are integrated, social welfare is higher without integration than with integration. However, if the seller switches from a pooling equilibrium to a separating equilibrium when the agreements are integrated, social welfare with integration may be higher than that without integration. When we differentiate SW_p and SW_s with respect to α ,

$$\frac{\partial SW_p}{\partial \alpha} = \frac{di_p}{d\alpha}q'(i_p)r\alpha(v_h - v_l)$$

and

$$\frac{\partial SW_s}{\partial \alpha} = \frac{di_l}{d\alpha}q'(i_l)r\alpha(v_h - v_l)$$

Note that in $\frac{\partial SW_s}{\partial \alpha}$, we can ignore any terms with i_h because $\frac{di_h}{d\alpha} = 0$. From the seller's first order conditions, we can derive $\frac{di_p}{d\alpha}$ and $\frac{di_s}{d\alpha}$ as follows:

$$\frac{di_p}{d\alpha} = \frac{q'(i_p)r(v_h - v_l)}{q''(i_p)\{r(\alpha v_l + (1 - \alpha)v_h) + (1 - r)v_l\} - c''(i_p)} < 0$$

and

$$\frac{di_l}{d\alpha} = \frac{q'(i_l)r(v_h - v_l)}{q''(i_l)\{r(\alpha v_l + (1 - \alpha)v_h) + (1 - r)v_l\} - c''(i_l) - r\{q''(i_l)v_h - c''(i_l)\}} < 0$$

Although we know that because $i_p > i_l$ and $q'' < 0$, $0 < q'(i_p) < q'(i_l)$, unless we know the signs of q''' and c''' , $\frac{di_p}{d\alpha}$ may be larger or smaller than $\frac{di_l}{d\alpha}$ which makes the difference between $\frac{\partial SW_p}{\partial \alpha}$ and $\frac{\partial SW_s}{\partial \alpha}$ uncertain. ■

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Notes

¹If a written agreement is fully (as opposed to partially) integrated, even extrinsic evidence that is not inconsistent with the written terms is not allowed. The parol evidence rule does not, however, prohibit parties from introducing extrinsic evidence to clear the ambiguity of a written term.

²Economic analysis of the parol evidence rule has been far from extensive. A notable exception is Posner (1998), who examines the costs and benefits of the soft versus the hard parol evidence rule in a symmetric information setting. Under the hard parol evidence rule, the court relies (almost) exclusively on the writing, whereas under the soft parol evidence rule, the court also considers extrinsic evidence. This conception is similar to integration versus non-integration.

³A merger clause might say “This Agreement constitutes a complete and exclusive statement of the terms of the agreement between the parties with respect to its subject matter.”

⁴The best demonstration of this is in Spier (1992). In her story, an informed party may decide not to offer a complete contract because she is afraid of sending a bad signal to an uninformed party. In the modeling approach, this paper differs from hers in at least two respects: there is no explicit transactions cost (of writing a complete agreement), and an uninformed party makes a contract offer to an informed party (to screen).

⁵Commercial contracting often entails protracted negotiations where parties make self-serving statements that do not necessarily become part of the written agreement. Without integration, parties can introduce such self-serving statements (made during negotiation) to vary or modify the written terms of the contract.

⁶Under the *Hadley* rule, unless the buyer communicates his special circumstances to the seller, the seller will not be liable for unforeseen consequences. By default, the seller’s liability is limited. See Ayres and Gertner (1989) and Bebchuk and Shavell (1991).

⁷Limited warranty does not mean no warranty. In reality, it is relatively easy to include an unconditional warranty disclaimer. The challenge, in the current story, is whether the seller can expand the warranty coverage (beyond no coverage) in proportion to the buyer’s type. As another motivating example, asset purchase agreements often contain a list of liabilities (in an appended schedule) that the buyer will assume from the seller. Unless the descriptions of the liabilities can be exact, either side can argue ex post to include or exclude certain types of liability from the list.

⁸The model also assumes that the court cannot, by looking at the prices alone, reverse-engineer the warranty terms of the contract. If there are other features of the contract, not-modeled but orthogonal, that can influence the contract price, the court will not be able to tell whether a high price is due to full warranty or due to other reasons.

⁹Although it is not essential that α must be larger than one-half, it can be easily shown that to achieve separation we need $\alpha \geq \frac{(1-q(i_h))}{(1-q(i_h))+(1-q(i_l))}$, which is smaller than one-half.