Supplementary Appendix for: Daughety and Reinganum, "Competition and Confidentiality" Department of Economics and Law School, Vanderbilt University, July 2004 (revised August 2005).

Supplementary Appendix

Proof of Proposition 4. The claims regarding the *interim* equilibrium prices, the price difference and the *ex ante* expected price all follow directly upon noting that $\eta > 1$ is an increasing function of λ. The claims regarding the *interim* quantities also follow from these properties of η, although a little more algebra (using the fact that $\partial\eta/\partial\lambda = (\eta - 1)/(\eta - \lambda)$) is required. Finally, since the *interim* profits are the product of the relevant price-cost margins and the *interim* quantities (both of which are increasing in λ), they are increasing in λ as well. QED

Proof of Proposition 5. It is clear by inspection that $\Pi^C_{LL} < \Pi^C_{LH}$ and $\Pi^C_{LL} < \Pi^C_{HH}$. It is tedious but straightforward to show that $\Pi^C_{HL} < \Pi^C_{LL}$ (under the maintained assumption that $\epsilon > \lambda\Delta L^C_P$). It remains to rank Π^C_{LH} and Π^C_{HH}. Comparison yields: $\Pi^C_{HH} > (<)\ \Pi^C_{LH}$ as $g(\lambda) \equiv \epsilon(L^C - k)\Delta - \lambda[\Delta L^C_P(\eta - 1)/2]^2 > (<)\ 0$. Since $g(0) > 0$, $g(1) < 0$ and $g'(\lambda) < 0$, there exists a unique $\lambda \in (0, 1)$ such that $\Pi^C_{HH} = \Pi^C_{LH}$. QED

Proof of Proposition 10. According to Proposition 7, $\Pi^C_{ss} > \Pi^O_{ss}$, for s = L or H; moreover, $\Pi^C_{LH} > \Pi^O_{LH}$. The only problematical expression is $\Pi^C_{HL} - \Pi^O_{HL}$; even if this difference is negative, there is a positive contribution (of $\Pi^C_{LH} - \Pi^O_{LH}$) which occurs with the same probability. We now show that $[(\Pi^C_{HL} + \Pi^C_{LH}) - (\Pi^O_{HL} + \Pi^O_{LH})]$ is positive if either: (i) for fixed ϵ and fixed $\nu^C \leq \nu^O$, λ is sufficiently close to 1; or (ii) for fixed $\lambda \in (0, 1)$ and fixed $\nu^C \leq \nu^O$, ϵ is sufficiently large. Thus, in either of these cases, $E_\theta[\Pi^C] - E_\theta[\Pi^O] > 0$, thus establishing the claims made in Proposition 10.

First, note that the difference $(\Pi^C_{HL} + \Pi^C_{LH}) - (\Pi^O_{HL} + \Pi^O_{LH}) > 0$ if and only if:

$$2\epsilon\lambda x + (\epsilon - x)[x + (L^C - k)\Delta] > 2[(L^O - k)\Delta/3]^2, \text{ where } x \equiv \Delta L^C_P(\eta - 1)/2. \qquad \text{(SA1)}$$

Proof of claim (i). It suffices to show that inequality (SA1) holds for $\lambda = 1$. Recall that $(\epsilon - x) > 0$ is ensured by our assumption that $\epsilon > \lambda\Delta L^C_P$ (from Section 3). Thus, a sufficient condition for (A4) to hold is that $2\epsilon\lambda x > 2[(L^O - k)\Delta/3]^2$ for $\lambda = 1$. When $\lambda = 1$, then $x = (\epsilon\Delta L^C_P)^{1/2}$ and this inequality becomes: $2\epsilon(\epsilon\Delta L^C_P)^{1/2} > 2[(L^O - k)\Delta/3]^2$. Recall that $\epsilon > (L^O - k)\Delta/3$ (from Section 3) and $\epsilon > \Delta L^C_P$ (from Section 3, substituting $\lambda = 1$). In addition, recall that $L^C_P \geq L^O_P$; the plaintiff bears a greater loss under confidentiality. Thus, $2\epsilon(\epsilon\Delta L^C_P)^{1/2} > 2[(L^O - k)\Delta/3]\Delta L^C_P \geq 2[(L^O - k)\Delta/3]\Delta L^O_P > 2[(L^O - k)\Delta/3]^2$.

Proof of claim (ii). The right-hand side of inequality (SA1) is a constant with respect to ϵ, while the left-hand-side consists of the term $2\epsilon\lambda x$, which is an increasing function of ϵ of order $o(\epsilon^{3/2})$, plus the product of two positive functions. The function $(\epsilon - x)$ is $o(\epsilon)$, while the function $[x + (L^C - k)\Delta]$ is $o(\epsilon^{1/2})$. Thus, the left-hand-side exceeds the right-hand-side for sufficiently large ϵ. QED.

A Model of Settlement Bargaining as a Stage 3 Continuation Game

The amount of the settlement is given by the Nash Bargaining Solution to a complete information game, taking into account the parties' relevant costs of settlement versus trial.[1] Notice that compensation is determined by the tort system, rather than by *ex ante* contracting between the firm and a consumer. In the case of injury, a firm cannot limit its liability for a consumer's harm through contractual means. Under the penalty doctrine, the common law does not enforce stipulated damages in excess of expected damages (Rea, 1998, p.24). Thus, the highest enforceable value of stipulated damages would be δ. But then, assuming that the firm cannot commit not to dispute causation (that is, the consumer would still have to present a viable case in order to have the contract enforced), the consumer's expected loss would be unchanged.

Let k_{SP} and k_{SD} denote the costs of negotiating a settlement for P and D, respectively, and let k_{TP} and k_{TD} denote the incremental costs of trial for P and D, respectively. By negotiating and settling rather than going to trial, P (respectively, D) individually spends the amount k_{SP} (respectively, k_{SD}), but they jointly save the amount $K_T \equiv k_{TP} + k_{TD}$. The resulting Nash Bargaining Solution involves the plaintiff with a viable case receiving her disagreement payoff, $\delta - k_{SP} - k_{TP}$, plus one-half of the saved incremental trial costs. Thus, the plaintiff receives $\delta - k_{SP} - k_{TP} + K_T/2$. Similarly, the defendant pays his disagreement payoff,[2] less one-half of the saved incremental trial costs. Thus, the defendant pays $\delta + k_{SD} + k_{TD} - K_T/2$.

Since not all cases are viable, we compute the continuation payoffs for the consumer and the firm, conditional upon an accident. A harmed consumer suffers a loss of δ and receives a settlement of $\delta - k_{SP} - k_{TP} + K_T/2$ if she has a viable case, which occurs with probability ν^r in regime r. Thus, the expected loss borne by a harmed consumer in regime r is given by $L_P^r = \delta - \nu^r(\delta - k_{SP} - k_{TP} + K_T/2)$, r = O, C. Similarly, the expected loss borne by the firm when a consumer is harmed in regime r, denoted L_D^r, is given by $L_D^r = \nu^r(\delta + k_{SD} + k_{TD} - K_T/2)$, r = O, C. We assume that each party bears some loss; that is, $L_P^r > 0$ and $L_D^r \geq 0$. For simplicity, let L^r denote the combined loss due to consumer harm and settlement costs: $L^r \equiv L_P^r + L_D^r = \delta + \nu^r K_S$, where $K_S \equiv k_{SP} + k_{SD}$.

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[1] Since settlement and litigation are represented by a complete information game, there will be no trials. Empirically, a high percentage of suits result in settlement (or are withdrawn); see Gross and Syverud (1996) or Dore (1999). Theoretically, the model could be extended to allow for settlement bargaining failure, such as might result under asymmetric information (e.g., if the level of damages were private information for each plaintiff); see Hay and Spier (1998) or Daughety (2000) for surveys of this literature.

[2] Here D's disagreement payoff does not include effects on his continuation payoffs. None arise in an open regime. We abstract from such effects in a confidential regime as well, under the assumption that any single P choosing trial has a negligible effect on the viablity of other cases. Alternatively, if D has all the bargaining power, each P settles for her disagreement payoff (and D's disagreement payoff is irrelevant).

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