

# Torts in Open Contents\*

## (Extended Abstract)

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### **Abstract**

We extend traditional tort analyses by including value-adding resellers who do not need to pay the innovators (i.e. original sellers) for production. In some key open contents processes such as open source,

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downstream licensing is royalty-free but profits from other means derived from the software are allowed. Buyers, especially large vendors, can then become resellers to compete with the innovators. The innovators, however, can actually share the cost with the resellers to indemnify product and intellectual property infringement liabilities of the other downstream buyers and the innovators. Our theoretical results aim at establishing the optimal liabilities arrangements across agents. (Note: The empirical test using data on open content licenses is currently in progress.)

### **1 Introduction**

The scope of open contents is defined here as copyrightable subject matter that is:

- observable by the public (not just fixed on a tangible medium)
- modifiable without reverse engineering in an unauthorized way, or without costly changes even for trivial changes
- comprehensible to persons having ordinary skills in the trade
- without royalty for use, modification, and redistribution

The open contents phenomenon potentially aggravates the problem of expropriation by blurring the delineation of rights. The sources and economic

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consequences of “expropriation” put forth in the literature vary. The incomplete contracting literature is along the line that consequences not fully specified in a contract reduce investment (Grossman and Hart [1986] and Hart and Moore [1990]). On the other hand, “expropriation” or more generally “externality” could be argued as merely disguises for the absence of the right to contract (Cheung [1970]), and thus the outcomes become efficient by subsequent contracting, which is feasible as long as property rights are clearly defined and transaction costs are low (Coase [1960]). In other words, the difficulty to commercialize new innovations due to overlapping intellectual property rights (Gallini [2002], Jaffe and Lerner [2004]) could be thought of as a situation in which transaction costs are high or property rights are unclear.

In some key open contents such as open source, creative-commons or wikipedia-type contents, downstream licensing is royalty-free but profits from other means derived from the contents are allowed. Buyers, especially large vendors, can then become resellers to compete with the innovators (i.e., original sellers). On the other hand, large vendors, especially when there are spillover effects to their other markets, could indemnify some of the intellectual property infringements (e.g., from patent thickets) of the small innovators. In this paper, we extend a standard injurer-victim tort model into an innovator-vendor-user model to establish some optimal liabilities arrangements across agents.

## 2 Theory

### 2.1 Setup

In this section, we try to model the decision problems of several active agents in the economy relevant to the open contents landscape: social planner, users, innovators, and value-adding vendors (resellers). In addition, there are two inactive agents namely, Nature, and Hidden (a group of intellectual property owners, other than the innovators, who have engaged in intellectual property disputes in question). The inactive agents collect receipts from users, innovators, and value-adding vendors but whose actions are not explicitly modeled.

In the standard bilateral-care accident models (Landes and Posner [1987], Miceli [1997] and Shavell [1980]), the choice of care and level of activity are relevant. We extend such model into one which is a three-way care accident model. The care levels here refer to the efforts, measured in monetary amount, made to avoid some total expected damage paid to the inactive agents. The damages are categorized into two groups: product failures and intellectual property infringements. The damages are paid to Nature for the former and thus there are no warm-body winners after payments, and to Hidden for the latter and thus there are expropriations because by definition it is hard to enter into contractual arrangements with Hidden<sup>1</sup>.

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<sup>1</sup>Since Hidden is by definition hidden, there is no way to contract with them and thus they are absent in the model. This is not to say that there are no other intellectual property owners that you can contract with. For example, not all trolls are hidden if they

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Let  $k_v l_v, k_u \tilde{l}_u, k_i l_i$  be expenditure on care per unit of activity by a vendor, each of the  $n$  users, and an innovator, respectively. Note that we use a representative user, who consumes the total of all users, to represent the users' decision problem. The care level,  $l_u$ , the representative user chooses is  $n$  multiplied by the care level  $\tilde{l}_u$  chosen by an individual user. That is,  $l_u = \tilde{l}_u n$ . Denote  $D(l_v + l_i, l_u)$  the total expected damage per unit of activity, where  $D_1 < 0, D_2 < 0, D_{11} > 0, D_{22} > 0, D_{12} > 0$ , and  $D_{21} > 0$ . For simplicity, we assume that  $l_v$  and  $l_i$  are perfect substitutes. The level of activity,  $Q$ , which is better termed as output in this context because it is the number of copies of the same information good distributed by the innovators and the vendors.

The liability for active actor  $j$ ,  $s_j$ , is defined to be the fraction of  $D$  that  $j$  needs to pay no matter there is or is no damage ex post because  $D$  is in expected terms paid ex ante. In general,  $s_j$  is distributed according to some distribution  $f_j$  with the expected value of  $\bar{s}_j$ .

Let  $v(Q)$  be the marginal consumption benefit for a representative user of the information good. There is diminishing marginal benefit because by assumption  $v' < 0$ . Let  $c_i(\cdot)$  be the total production cost of an innovator.  $R$  is the price paid to either the innovators or the vendors depending on whom the user obtains the copy of the same information good from.

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jump out of the bush early and negotiate a contract with other agents.

## 2.2 The Users' Problem

The problem for the users is assumed to be equal to the one solved by a representative user. Assume that there is only one piece of information good to be produced, which requires a fixed cost of  $F$ . Users then consume the  $q_i$  and  $q_v$  copies of this good from the innovators and the vendors, respectively. Note that in equilibrium,

$$q_v + q_i = Q \quad (1)$$

So the user buys a total of  $Q$  copies, and chooses a care level  $l_u$  to maximize:

$$U = \int_0^Q v(h)dh - Q[R + \bar{s}_u D(l_v + l_i, l_u)] - Qk_u l_u \quad (2)$$

where  $\frac{\partial R}{\partial Q} = 0$ , and  $\bar{s}_u$  is the expected liability share of the users for the damage. The care level refers to the caution the user taken to ensure that the intellectual property rights are cleared, and that the information good is properly maintained and operated.

## 2.3 The Innovator's Problem

In this model, an information good is not serviceable unless it is properly documented and provided with customer support. For each copy sold by the innovator, a marginal cost of  $c'_i(\cdot)$  will be incurred by the innovator. The total variable cost of production is  $c_i(\cdot)$ . In addition, the innovator also chooses a care level  $l_i$ , at a cost of  $k_i$  per copy reflected in  $Q$  (important, not  $q_i$ , because

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it's open content), to directly adjust the expected damage  $D$ . The marginal care cost increases with  $Q$  because the more copies circulated, the higher the chance that a bug or problem is experienced and that an intellectual property infringement is detected.

For simplification, there is only one innovator who is selected from competition. Thus, the innovator makes zero profit.

The problem for the innovator is to choose  $q_i$  and  $l_i$  to maximize:

$$\Pi_i \equiv q_i R - F - c_i(q_i) - Q \bar{s}_i D(l_v + l_i, l_u) - Q k_i l_i \quad (3)$$

where  $\bar{s}_i$  is the expected liability share of the innovator.

### 2.4 The Vendor's Problem

There is one vendor who is selected from competition. Thus, the vendor makes zero profit. The vendor incurs a cost  $c_v(\cdot)$  to redistribute some copies of the good created by the innovator.

On the other hand, this vendor enjoys a net spillover benefits,  $\omega(Q)$ , of the stock of copies in the economy. For example, the vendor might be selling a complementary product in another market or benefiting from the reputation of redistribution. It implies that even if  $q_v = 0$ , as long as  $q_i > 0$ , this vendor might find it beneficial to incur  $l_v$ , at a cost of  $k_v$  per copy reflected in  $Q$ , to

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adjust the expected damage  $D$ :

$$\Pi_v \equiv q_v R - c_v(q_v) + \omega(Q) - Q\bar{s}_v D(l_v + l_i, l_u) - Qk_v l_v \quad (4)$$

### 2.5 Comparative Statics

Using  $+$  and  $*$  to denote decentralized and centralized equilibrium values, efficiency is defined to be achieved if the two values coincide.

**Proposition 1** *Given some strictly positive care levels, the liability rules are irrelevant for  $q_i^*$  and  $q_v^*$ . But the efficient quantities levels of  $q_i^*$  and  $q_v^*$  are not necessarily obtained from the decentralized equilibrium. In fact,  $q_i^* = q_i^+$  if and only if both  $\bar{s}_v = \frac{\omega'(Q) - k_v l_v}{D}$  and  $\omega'(Q) - k_v l_v > 0$  are true and  $q_v^* = q_v^+$  if and only if  $\bar{s}_i = 0$ .*

**Proposition 2** *Efficient care levels cannot be simultaneously achieved by either strict liability ( $\bar{s}_u = 0$ ) or no liability ( $\bar{s}_u = 1$ ).*

**Proposition 3** *The efficient quantities can be restored through bargaining such that the marginal spillover effect completely offsets the total marginal care cost of the innovators and vendors and/or the liability share of the user.*

**Proposition 4** *For non-trivial quantity produced, efficient care levels can be achieved by reimbursing the care costs of the innovator, the vendor, or both.*

### 3 Conclusions

Our contributions are threefold.

First, we extend traditional tort analyses in one key direction—the inclusion of value-adding resellers who do not need to pay the original sellers (innovators) for production. In our model, the ubiquitous but vague term “expropriation” is given a precise definition. We further analyze how bargaining can achieve social efficient output and care levels.

Second, the recent debate (Boldrin and Levine [2002], Klein, Lerner, and Murphy [2002], and Romer [2002]) focuses on the necessity of intellectual property in face of the new sharing technologies such as Napster. We fill a gap in the debate by enlarging the scope of analysis to include information goods such as software files. The sharing of software allows resellers to help increase the quality of the software by, for example, sharing the efforts to fix software vulnerabilities.

Third, we supplement the patent pool literature by pointing out the incentive of liability indemnification. Patent owners could give up her monopoly rights on the blocking patents to realize more profits in other markets that the benefits of the enabled innovation could spillover to.

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