Chapter 3
Applying the Economic Model of Tort Law

An Economic Model of Products Liability

Social optimum. First consider the social optimum in a bilateral care model of products liability. Let

$L(x,y)$ = expected damages per unit of output;
x = manufacturer's spending on care per unit;
y = consumer's (victim's) spending on care per unit;
q = number of units of output;
n = number of firms;
$c(q)$ = total cost of production per firm, where $c'>0$, $c''>0$;
$v(q)$ = marginal consumption benefit of the good, where $v'<0$, reflecting diminishing marginal benefits.

Social welfare is given by

$$W = \int_0^{nq} v(z)dz - nc(q) - nq[x + y + L(x,y)] \tag{3.1}$$

which is the sum of consumption benefits over the quantity sold, minus total costs, including production, care, and damages. The first-order conditions for *x, y, q*, and *n*, respectively, are

$$1 + L_x(x,y) = 0 \tag{3.2}$$

$$1 + L_y(x,y) = 0 \tag{3.3}$$

$$v(nq) = c'(q) + x + y + L(x,y) \tag{3.4}$$

$$v(nq) = c(q)/q + x + y + L(x,y) \tag{3.5}$$

Conditions (3.2) and (3.3) define optimal care on a per unit basis (given the assumption that liability and care exhibit constant returns to scale in output). Condition (3.4) says that the good should be produced to the point where marginal consumption benefits equal total marginal costs, including safety and damages. Condition (3.5) says that firms should enter until the marginal consumption benefits equal average costs. Combining (3.4) and (3.5) gives the usual condition that firms should operate at the point where marginal costs equal average costs, or $c'(q)=c(q)/q$. Finally, note that neither the *price* of the product, nor the *assignment of liability* enters these optimality conditions.

Market outcomes. Now let p be the price of the product and s the share of damages borne by firms, where $0 \leq s \leq 1$. (Thus, consumers bear a fraction $1-s$ of damages.) Consumers will purchase the good up to the point where marginal benefits equal the price plus any accident related costs:

$$v(Q) = p + y + (1-s)L(x,y) \tag{3.6}$$

where $Q=nq$ is aggregate output. Also, for each unit of the good purchased, consumers will choose care to minimize their costs, $y+(1-s)L(x,y)$, yielding the first-order condition

$$1 + (1-s)L_y(x,y) = 0. \tag{3.7}$$

Each firm will choose its output and care to maximize profits: $\pi = pq - c(q) - q[x+sL(x,y)]$. The first-order conditions for q and x are therefore

$$p = c'(q) + x + sL(x,y) \tag{3.8}$$

$$1 + sL_x(x,y) = 0. \tag{3.9}$$

Free entry of firms implies that the profit for each is zero, or

$$pq = c(q) + q[x+sL(x,y)]. \tag{3.10}$$

Now combine (3.6) and (3.8) to get

$$v(Q) = c'(q) + x + y + L(x,y) \tag{3.11}$$

and combine (3.6) and (3.10) to get

$$v(Q) = c(q)/q + x + y + L(x,y) \tag{3.12}$$

Comparing (3.11) and (3.12) to (3.4) and (3.5) shows that output and the number of firms are efficient for any s, given x and y. This illustrates the irrelevance of the liability rule for these variables.

The care choices of consumers and firms, however, will not necessarily be efficient. By (3.7) and (3.9), consumers will only choose efficient care if $s=0$ (no liability), while firms will only choose efficient care if $s=1$ (strict liability). As we saw in chapter 2, however, both parties will choose efficient care under an appropriately structured negligence rule.

Theoretically, the market can yield x^* and y^* regardless of the liability rule if bargaining is costless (by the Coase Theorem). For example, under no liability, firms will choose efficient care if consumers offer a higher price in return for a safer product. Similarly, under strict liability, consumers will take efficient care if firms lower their prices in return for the lower accident risk. However, these bargains will not be likely to occur in actual markets due to transaction and monitoring costs.