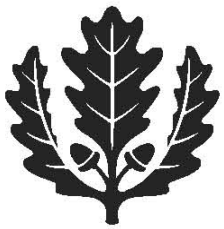

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Liability versus Regulation for Controlling Product-Related Risks

by

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Abstract: Liability and regulation are equally good at controlling product-related risks when consumers suffer the same expected harm and perceive risks correctly. When they misperceive risks, however, liability is preferred because the product price accurately signals risk and therefore induces efficient purchase decisions. When consumers vary in their susceptibility to harm and accurately perceive risk, regulation dominates liability because under regulation, consumers bear their own damages and are therefore induced to self-select in their purchase decisions. When consumers also misperceive risk, however, the choice between the two modes of risk control is ambiguous, with neither being capable of achieving the socially optimal outcome. Generally, regulation is preferred when consumers perceive risks fairly accurately, and liability is preferred when they do not.

JEL codes: K13, L51
Key words: Products liability, regulation, risk perceptions

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Liability versus Regulation for Controlling Product-Related Risks

1. Introduction

Liability and safety regulation represent alternative mechanisms for controlling the risks that often arise from otherwise socially beneficial activities. Liability represents a private response whereby the victim of an accident brings suit for monetary damages against the responsible party, while regulation is a publicly imposed and enforced standard of conduct or safety that potential injurers must adhere to under threat of legal sanction. Shavell (1984) has examined the optimal choice between these two modes of controlling risk in the context of a standard model of accidents between strangers (i.e., parties not in a contractual relationship). His analysis showed that neither approach generally produces the socially optimal level of risk-reduction. The drawback of regulation is that it sets a single standard that applies to all accident settings, given the inability of the regulator to observe victim-specific harm. Thus, care is not individualized under the optimal regulatory standard. Liability, in contrast, allows individualization of care under the assumption that injurers can observe and respond to individual victim types, but its effect on accident prevention is diluted because some injurers may escape suit or not have sufficient assets to pay damages. Thus, depending on the situation, either approach may be optimal, and in some cases it may be desirable to combine the two methods.

This chapter examines the choice between liability and safety regulation for controlling the risk of accidents involving products; that is, accidents in which the injurer and victim have a pre-existing contractual relationship.[1] In this context, the trade-off between the two modes of

[1] Previous models of products liability include Epple and Raviv (1978), Polinsky and Rogerson (1983), Landes and Posner (1985), Marino (1988), Daughety and Reinganum (1997), Hay and Spier (2005), and Spier (2011). For a recent survey, see Daughety and Reinganum (2011) .

risk control is different. This is true, first of all, because firms cannot individualize care (product safety) under either approach, given that, like the regulator, they cannot observe or respond to individual consumer susceptibility to harm. In other words, firms produce a single, standardized product for all consumers, and as a result, the individualization of care that ideally occurs under a liability rule in Shavell's model is not possible for product-related accidents. Even if all victims file suit and injurers can fully cover their losses, regulation will be at least as good as liability in establishing optimal product safety, all else equal.

A second difference between accidents involving strangers and product-related accidents is that in the latter case, consumers can observe the level of product safety before purchase.[2] As a result, they can decide whether or not to buy the product in the first place based on its consumption benefit relative to its risk. This decision provides a second avenue, not present in the accidents-between-strangers model, along which accidental harm can be reduced. This consideration is especially important when consumers vary in their susceptibility to harm—as in the case of food allergies, drug side effects, or their ability to use an inherently dangerous product (like a chain saw) correctly—because consumers can self-select in their purchase decisions, with those who are especially prone to harm (ideally) refraining from buying the product.

Note that a crucial factor in inducing this sort of self-selection is that consumers must expect to bear their own harm. For this reason, strict liability will not be able to achieve efficient sorting because it fully compensates victims for their losses, whereas regulation, because it leaves consumers to bear their own damages, will. This feature of regulation gives it an advantage over liability for product-related accidents, but exploiting that advantage requires that consumers correctly assess the risk of harm. If consumers misperceive risk, either over- or

[2] We therefore focus on goods whose safety features are readily observable—so-called inspection goods.

underestimating it, then they will buy too little or too much of the product (respectively) under a regulatory standard, even if that standard is optimally chosen. Liability, in contrast, is not hindered by consumer misperceptions precisely because victims do not bear their own damages. Instead, the firm, which is assumed to assess risk correctly, sets the price of the product to signal the average risk among purchasers, thereby mitigating the over- or underconsumption problem. The principal conclusion of this chapter is that, based on these competing factors (i.e., the absence of sorting under liability and the misperception of risk under regulation), regulation of product safety is preferred when consumers perceive risks fairly accurately, and producer liability for product accidents is preferred when they significantly misperceive risks.

The remainder of the chapter is organized as follows. Section 2 sets up the model. Section 3 then compares liability and regulation when consumers all suffer the same harm. In this benchmark case, we show that liability is at least as good as regulation for controlling product risk, and is strictly preferred when consumers misperceive risk. Section 4 turns to the case where consumers vary in their susceptibility to harm and examines the trade-off between the two modes of risk control, as described above. Finally, Section 5 concludes.

2. The Model

Consider a product the consumption of which creates the risk of harm. Let $\pi(x)$ be the true probability of an accident per unit of the product, where x is the manufacturer's dollar investment in product safety, or care (per unit), and $\pi'<0$, $\pi''>0$. Thus, as usual, product risk is decreasing at a decreasing rate in the firm's investment in safety.[3] To account for misperceptions, let $\lambda\pi(x)$ be the consumer's perceived risk, where $\lambda \leq 1$ is an index of the degree

[3] For simplicity, the model does not allow for victim care, interpreted, for example, as proper use of the product. As discussed, consumers can only affect risk by their decision of whether or not to purchase the product. These assumptions seem reasonable for the case of food and drugs.

of the misperceptions (Polinsky and Rogerson, 1983; Spence, 1977). For simplicity, we focus on the case of consumer underestimation of risk, though the main results would also hold for overestimation. We assume, however, that firms correctly assess risk.

Let a be the gross value of a unit of the product to the consumer (i.e., the value of the product if it were risk-free), and let h be the harm from an accident. Thus, the net expected value of a unit of the product is $a–\pi(x)h$. In the general model below, we will assume that consumers differ in both a and h. As a benchmark, however, we will consider a simpler version in which all consumers have a common h (or at least have the same expected h prior to purchase) and only vary in their gross valuation, a. Let $G(a)$ be the distribution function of a, with the associated density $g(a)$. Consumers have private information about their own a, though firms and regulators know the distribution. In this initial version of the model, firms and regulators are assumed to know the common h of consumers. Finally, let c be the (fixed) production cost per unit, exclusive of safety features. The total unit cost of production is therefore $c+x$. Throughout, we will assume that consumers buy at most one unit of the product.

3. Consumers Suffer the Same Harm

As noted, we first examine a model where all consumers expect to suffer the same harm from a product-related accident. We begin by deriving the efficient outcome, and then compare the actual outcome under strict liability and an optimally chosen safety standard.

3.1. The Social Optimum

First consider the efficient consumption decision, given x, which we assume consumers can observe prior to purchase. It is efficient for a consumer of type a to purchase the product if and only if

$$a - \pi(x)h \geq c + x,$$

or if and only if

$$a \geq c + x + \pi(x)h \equiv \hat{a}. \quad (1)$$

Given efficient purchase, the optimal level of safety maximizes social welfare, which equals net consumption benefits for those consumers who purchase the product:

$$W = \int_{\hat{a}}^{\infty} (a - c - x - \pi(x)h)g(a)da. \quad (2)$$

The resulting first-order condition for x is

$$1 + \pi'(x)h = 0, \quad (3)$$

which, as usual, equates the marginal cost and marginal benefit of safety per unit. Let x^* denote the resulting level of safety.

3.2. Strict Liability

Under a rule of strict liability, the consumer expects to be fully compensated for any damages after the fact, and so purchases a unit of the product if and only if $a \geq P$, where P is the price. The expected profit of a representative firm is equal to

$$\Pi = \int_{P}^{\infty} (P - c - x - \pi(x)h)g(a)da. \quad (4)$$

To avoid introducing market power issues,[4] we assume that the firm is competitive and takes P as given. Thus, its only decision is over x. Note that maximizing (4) yields the same condition as (3), so the firm invests in efficient safety, x^*. Assuming zero profit, we obtain the price

$$P = c + x^* + \pi(x^*)h. \quad (5)$$

Substituting this into the consumer's purchase criterion yields (1), so consumption of the product is also efficient. Thus, strict liability yields in the socially optimal (first-best) outcome.[5]

[4] For models of products liability where firms have market power, see Epple and Raviv (1978), Polinsky and Rogerson (1983), and Marino (1988).

3.3. Regulation

Now consider a regulatory standard that sets the required level of safety at x_s. Since consumers bear their own risk in this case, the purchase decision is based on

$$a \geq P + \lambda\pi(x_s)h \equiv a_S(\lambda), \tag{6}$$

where, recall, $\lambda\pi(x_s)$ is the perceived risk, with $\lambda \leq 1$. Assuming that the firm complies with the regulatory standard, its profit is

$$\Pi = \int_{a_S(\lambda)}^{\infty} (P - c - x_s) g(a) da. \tag{7}$$

Thus, by meeting the standard, the firm avoids liability or any other legal sanction.[6] Zero profit implies that $P=c+x_s$, which, from (6), yields

$$a_S(\lambda) = c + x_s + \lambda\pi(x_s)h. \tag{8}$$

Consumers therefore make efficient purchase decisions if $\lambda=1$, but they will overconsume the product if $\lambda<1$, given x_s.

The safety standard is chosen to maximize welfare, which is given by

$$W_s = \int_{a_S(\lambda)}^{\infty} (a - c - x - \pi(x)h) g(a) da. \tag{9}$$

The first-order condition defining x_s, after re-arranging, is

$$1 + \pi'(x)h = \frac{(1-\lambda)\pi(x)hg(a_S(\lambda))(\partial a_S/\partial x)}{1-G(a_S(\lambda))}, \tag{10}$$

where, from (8), $\partial a_S/\partial x = 1 + \lambda\pi' h$. Realized social welfare, denoted $W_S^*(\lambda)$, is given by (9) evaluated at $x_S(\lambda)$. Note that when $\lambda=1$, the right-hand side is zero and $x_s(1)=x^*$, the efficient

[5] Because we are focusing on a different trade-off from that in Shavell (1984), we assume a perfectly functioning liability system and no possibility of judgment-proofness on the part of the firm.

[6] If the standard is administered by a regulatory agency like the FDA, the firm must comply under penalty of sanction. Note that a negligence standard administered by a court would have the same effect on the firm's profit, (assuming that the firm finds it optimal to comply) and on consumer behavior. Thus, for purposes of this paper, there is no difference between a regulatory (publicly-imposed) standard and a negligence (court-imposed) standard.

level of safety. Thus, when consumers correctly perceive risk, the regulatory standard approach, like strict liability, achieves the socially optimal outcome.

When $\lambda<1$, however, x_s will deviate from x^*. Starting from x^*, as λ falls below 1, $1 + \lambda\pi' h>0$, and the right-hand side of (10) becomes positive. Thus, $1+\pi' h>0$ at the optimum, which implies that $x_s>x^*$, or the stringency of the standard is increased above the efficient level. Intuitively, when consumers underestimate risk, they will overconsume the product according to (8) (i.e., a_S will be too low). The regulator will optimally respond by increasing the required level of product safety above the first-best level. The resulting outcome is therefore second-best. In contrast, the outcome under strict liability is not affected by consumer perceptions, so it must be more efficient than the regulatory standard in this case.

The results of this section can be summarized as follows:

Proposition 1: Suppose that all consumers expect to suffer the same harm from a product-related accident. Then (a) when consumers correctly perceive product risk, both strict liability and an optimally chosen safety standard achieve the first-best outcome; (b) when consumers underestimate risk, strict liability continues to achieve the first-best outcome, but the outcome under the safety standard is second-best. Thus, strict liability is more efficient than the safety standard.

This result implies that liability is at least as good as regulation for controlling product risk when consumers suffer the same harm. The advantage of liability is that it avoids the problem of consumer misperceptions because accident victims are fully compensated. Instead, the price of the product accurately signals risk to consumers. When consumers vary in their susceptibility to risk, however, the price can only signal average risk, so liability will no longer

be able to achieve the first-best outcome. In that case, the choice between liability and regulation (which is also unable to achieve the first-best) becomes ambiguous, as the next section shows.

4. Consumers Vary in Their Harm

Suppose that consumers vary in the amount of harm they expect to suffer from a product-related accident. Consumers know their own *h* prior to purchase, but firms cannot observe individual *h*'s.[7] However, firms know the distribution function of *h*, *F(h)*, and the associated density, *f(h)*. As above, we first derive the social optimum, and then compare liability and regulation.

4.1. The Social Optimum

Efficient purchase continues to be defined by the inequality

$$a \geq c + x + \pi(x)h \equiv \hat{a}(h). \tag{11}$$

but now, because consumers vary in two dimensions, this condition defines an efficient-purchase *region* in (*a*,*h*) space, as shown in Figure 1, where the positively sloped line is the locus of points defined by (11) written as an equality. Note that it is efficient for consumers with high *a* and/or low *h* to purchase the product.

[Figure 1 here]

Given this purchase region, the efficient level of product safety maximizes the following welfare function:

$$W = \int_0^\infty \int_{\hat{a}(h)}^\infty (a - c - x - \pi(x)h)g(a)f(h)dadh. \tag{12}$$

The resulting first-order condition is

[7] None of the previous models of products liability (see citations in footnote 1 above) allows consumers to differ in harm in a known way *prior* to purchase.

$$\int_0^{\infty} \int_{\hat{a}(h)}^{\infty} (1 + \pi'(x)h) g(a) f(h) da dh = 0. \quad (13)$$

Let x^{**} denote the socially optimal level of safety as defined by (13). Note that this optimum is not first-best in the sense that a single level of safety is set for all consumers, regardless of their individual susceptibility to harm (i.e., x is not conditioned on h). The chosen level is tailored, however, to the average harm of those consumers who actually purchase the product (as defined by (11)), rather than to the average harm in the population as a whole. In other words, for each a, consumers with relatively high h refrain from purchase, and as a result, the level of product safety defined by (13) is lower than would be chosen based on the overall average harm.

4.2. Strict Liability

Now consider the outcome under strict liability. As above, consumers expect to be fully compensated for any harm and so will purchase the product if and only if $a \geq P$, where P is the price. Thus, only variation in a matters for consumers since the price cannot be individualized to reflect consumer-specific risk. As a result, in contrast to the model with a single level of harm, the first-best outcome will not generally be attainable under strict liability.

The profit of a representative firm in this case is given by

$$\Pi = \int_0^{\infty} \int_P^{\infty} (P - c - x - \pi(x)h) g(a) f(h) da dh$$

$$= [1 - G(P)](P - c - x - \pi(x)E(h)). \quad (14)$$

The profit maximizing safety level, denoted x_L, therefore solves the first-order condition

$$1 + \pi' E(h) = 0. \quad (15)$$

Thus, the firm chooses safety based on the average harm in the *population as a whole*. This reflects the absence of self-selection by consumers based on their individual susceptibility to risk. As a consequence, the firm chooses a higher level of safety than is implied by (13) (i.e.,

$x_L > x^{**}$), given that the population of actual consumers includes some high-risk types who would be deterred from purchase in the socially optimal outcome. Self-selection based on individual consumer harm is not possible under strict liability because there is a single price,

$$P = c + x_L + \pi(x_L)E(h), \tag{16}$$

which reflects the average risk among consumers.

Given (16), realized social welfare under a liability regime is given by

$$W_L = \int_0^\infty \int_P^\infty (a - c - x_L - \pi(x_L)h)g(a)f(h)dadh$$

$$= \int_P^\infty \big(a - c - x_L - \pi(x_L)E(h)\big)g(a)da. \tag{17}$$

Note that x_L, the firm's profit-maximizing safety level, also maximizes (17); that is, x_L coincides with the level of safety that a planner would choose to maximize (17). This is true because a planner, like the firm, would not be able to individualize product safety based on differences in consumer susceptibility to harm.

4.3. Regulation

Consider next the outcome under a regulatory standard, where $\lambda\pi(x)$ is again the risk of an accident as perceived by consumers when they bear their own damages.[8] The purchase region in this case is defined by the inequality

$$a \geq P + \lambda\pi(x_s)h \equiv a_S(\lambda, h), \tag{18}$$

which, unlike the case under strict liability, depends on both a and h (given $\lambda>0$). The expected profit of the representative firm is given by

$$\Pi = \int_0^\infty \int_{a_S(\lambda,h)}^\infty (P - c - x_s)g(a)f(h)dadh,. \tag{19}$$

[8] Although consumers know their own susceptibility to harm from an accident, they still may underestimate the likelihood of such an accident. In other words, their misperceptions only apply to the $\pi(x)$ function.

where x_s is the regulated level of product safety. As above, zero profit implies that $P=c+x_s$, in which case

$$a_S(\lambda, h) = c + x_s + \lambda\pi(x_s)h\ . \tag{20}$$

The purchase region therefore coincides with the efficient region if and only if consumers perceive risk accurately (i.e., if and only if λ=1).

The optimal safety standard is chosen to maximize welfare subject to the purchase region defined by (18):

$$W_s = \int_0^\infty \int_{a_S(\lambda,h)}^\infty (a - c - x - \pi(x)h)g(a)f(h)dadh. \tag{21}$$

The resulting first-order condition defining x_s is

$$\int_0^\infty \int_{a_S(\lambda,h)}^\infty (1 + \pi'(x)h)g(a)\, f(h)dh = \int_0^\infty (1-\lambda)\pi(x)h\frac{\partial a_S}{\partial x} f(h)dh = 0, \tag{22}$$

where, from (18), $\partial a_S/\partial x$=1+$\lambda\pi'h$. Realized welfare, $W_S^*(\lambda)$ is given by (21) evaluated at $x_S(\lambda)$. When consumers perceive risk correctly (λ=1), the right-hand side is zero and (22) coincides with the condition for efficient safety in (13); that is, $x_s(1)=x^{**}$. Also, the consumption region in (18) coincides with the efficient region in (11). Together, these results establish:

Proposition 2: Suppose consumers differ in the harm they would suffer from a product-related accident. Then if consumers correctly perceive the risk of an accident (i.e., if λ=1), the regulatory approach achieves the socially optimal outcome, whereas strict liability does not. Thus, regulation dominates liability.

When λ<1, however, optimal safety deviates from the social optimum for the same reason described in the previous section. In that case, the comparison between liability and regulation is ambiguous because neither achieves the socially optimal outcome. In comparing the two, however, we can prove the following result:

Proposition 3: Suppose consumers differ in the harm they suffer from a product-related accident, and they may misperceive risk. Then there exists a threshold value of λ, $\lambda_T \in (0,1)$, such that strict liability dominates when $\lambda<\lambda_T$ and the safety standard dominates when $\lambda>\lambda_T$.

Proof: First define $\widetilde{W}_s(\lambda)$ to be realized welfare under the optimal regulatory standard, but with the purchase region defined by the average rather than the actual harm in the population, i.e.,

$$\widetilde{W}_s(\lambda) = \int_{\tilde{a}(\lambda)}^{\infty} (a - c - \tilde{x}_s - \pi(\tilde{x}_s)h)g(a)da, \qquad (23)$$

where $\tilde{a}(\lambda) \equiv c+\tilde{x}_s+\lambda\pi(\tilde{x}_s)E(h)$, and $\tilde{x}_s$ is the level of product safety that maximizes (23). Note that when λ=0, $\widetilde{W}_s(0)=W_s^*(0)$ with $\tilde{x}_s(0) = x_s(0)$, and when λ=1, $\widetilde{W}_s(1)=W_L$, with $\tilde{x}_s(1)=x_L$. (The latter equality is true because when λ=1, $\tilde{a}(1) = P$ as defined in (16).) Now, differentiating (23) with respect to λ, and invoking the Envelope Theorem, we obtain

$$\frac{\partial \widetilde{W}_s}{\partial \lambda} = \int_0^{\infty} (\pi(\tilde{x}_s)h - \lambda\pi(\tilde{x}_s)\,E(h))g(\tilde{a})f(h)dh\frac{\partial \tilde{a}}{\partial \lambda},$$

$$= \pi(\tilde{x}_s)E(h)(1-\lambda)g(\tilde{a})\pi(\tilde{x}_s)E(h), \qquad (24)$$

which is positive given $0<\lambda<1$. Thus, $\widetilde{W}_s(\lambda)$ coincides with welfare under the optimal standard at λ=0, then rises with λ until it equals welfare under strict liability at λ=1. Differentiating the optimized value of (21) also shows that $\partial W_S^*(\lambda)/\partial\lambda > 0$. Now, since $W_S^*(1)$ coincides with the social optimum, and $\widetilde{W}_s(0) = W_S^*(0) < W_L$, it must be the case that $W_s^*(\lambda)$ cuts W_L from below at a single point $\lambda_T \in (0,1)$. ■

[Figure 2 here]

This result is shown graphically in Figure 2. Intuitively, when consumers perceive risk fairly accurately (i.e., when λ is near 1), the safety standard is preferred over liability because it requires consumers to bear their own harm and thereby induces them to self-select in their

purchase decisions. The closer perceptions are to the true risk, the closer this outcome will approach the social optimum. When consumers substantially underestimate risk, however, liability is preferred. Although no self-selection can occur in this case, the price at least signals the average risk among consumers and thus mitigates the problem of overconsumption.

4.4. Discussion of the Results

It is worth comparing the results here to those in Shavell (1984). Recall that in his model, the advantage of liability was that it allowed individualization of safety according to variation in victim types. This advantage is not possible in the context of product-related accidents because firms, like regulators, cannot tailor product safety to individual consumers. Further, under a liability regime those consumers who are especially susceptible to harm have no incentive to refrain from purchasing the product because they expect to be fully compensated for their damages. In contrast, regulation encourages some sorting based on risk because consumers expect to bear their own damages and thus self-select in their consumption decisions. This advantage of regulation is offset, however, to the extent that consumers misperceive risk, an issue that is not present under liability precisely because consumers are fully compensated for their damages. If the misperception problem is severe, liability will therefore be preferred over regulation because the price of the product will at least accurately signal average risk.

Having shown that neither liability nor regulation generally achieves the socially optimal outcome for product-related accidents when consumers vary in their susceptibility to harm, the question arises as to whether there might be a gain from using the two approaches simultaneously. Shavell (1984) showed that there was such a gain in his model of accidents between strangers, but that turns out not to be the case here. The reason is that the inefficiency in Shavell's model concerned the extent to which injurers had an incentive to tailor their care

choices to the circumstances of individual victims. In that context, he was able to show that the joint use of liability and regulation allowed a better such tailoring of care. That gain is not available in the current model because care (safety) is not individualized under either approach. The principal inefficiency here is instead over the extent to which consumers are induced to self-select in their purchase decisions based on their individual harm, and combining the two approaches cannot improve matters in this regard.

To see why not, suppose first that $\lambda<\lambda_T$, which implies that, according to Proposition 3, liability is preferred to regulation. Imposing a regulatory standard of x_s on top of the threat of liability will only change the behavior of firms if $x_s>x_L$ (assuming that the standard must be met), but since x_L is the same level of care that a planner would choose to maximize welfare under a liability regime, there would be no social gain from imposing a higher standard, given the behavior of consumers. As for consumers, since they are fully compensated under the liability system, their behavior is not sensitive to the level of risk (except as signaled indirectly by the price of the product). More particularly, the social benefit of a standard as noted above—the fact that consumers bear their own damages and so self-select—is not available when consumers are simultaneously compensated by the liability system.

Now suppose that $\lambda>\lambda_T$, which implies that regulation is preferred. The effect on consumer behavior of adding liability would be to remove any incentive for them to self-select because they would now be compensated for their losses. As a result, the gains from sorting would be lost. In effect, the outcome would become identical to that under liability alone, which is inferior to regulation for the case being considered.

The preceding argument shows that joint use of liability and regulation appears to offer no advantages over the sole use of the preferred mode of risk control for product accidents. Two

important qualifications might alter this conclusion. First, we have ignored imperfections in the liability system of the sort emphasized by Shavell—specifically, litigation costs and judgment proofness on the part of firms—both of which would impede its ability to induce firms to choose optimal product safety. That might leave room for the use of a safety standard in conjunction with liability under some circumstances. Second, if regulators acted on behalf of certain political interests rather than pursuing social welfare, the added threat of liability might be socially advantageous under the assumption that judges are less influenced by political interests than regulators.

[Table 1 here]

5. Conclusion

This chapter has compared liability and safety regulation for controlling risks arising from dangerous products. The principal conclusions, which are summarized in Table 1, are as follows. First, when consumers expect to suffer the same harm from product risk and perceive the risk of harm accurately, then liability and regulation are equally capable of achieving the socially optimal outcome in terms of both product safety (care) and consumption. Second, when consumers suffer the same harm but misperceive risk, then liability is preferred over regulation. Both approaches are capable of achieving optimal product safety, but because regulation leaves consumers to bear their own risk, they will tend to overconsume the product (assuming underestimation of risk). In contrast, because consumers expect to be fully compensated for their damages under liability, perceptions do not matter, but the product price accurately signals risk, thereby inducing efficient consumption.

Third, when consumers vary in their susceptibility to harm but perceive risk correctly, regulation dominates liability. In this case, full compensation of consumers under a liability

regime prevents them from engaging in optimal self-selection in their purchase decisions, whereas regulation induces efficient sorting because consumer bear their own damages. Finally, when consumers vary in their harm and misperceive risk, the comparison between the two approaches is ambiguous, with liability being preferred when consumers significantly misperceive risk, and regulation being preferred when they perceive risks fairly accurately.

An issue not considered in this chapter but which is often discussed in the context of products liability is insurance against product risk.[9] If consumers are risk averse, then it is efficient for them to be insured against the risk from product-related accidents. However, it should be clear from the arguments in this chapter that full insurance against product risk, whether provided by the liability system or by the private insurance market, will not be compatible with efficient sorting by consumer types.

[9] See, for example, Viscusi (1991, pp. 75-77) and Shavell (2004, Chapter 11).

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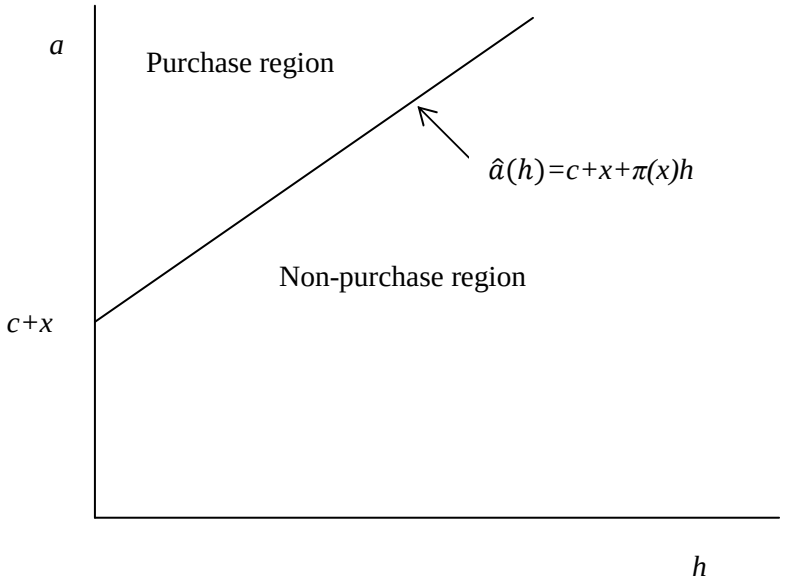

Figure 1. Efficient purchase region when consumers vary in both *a* and *h*.

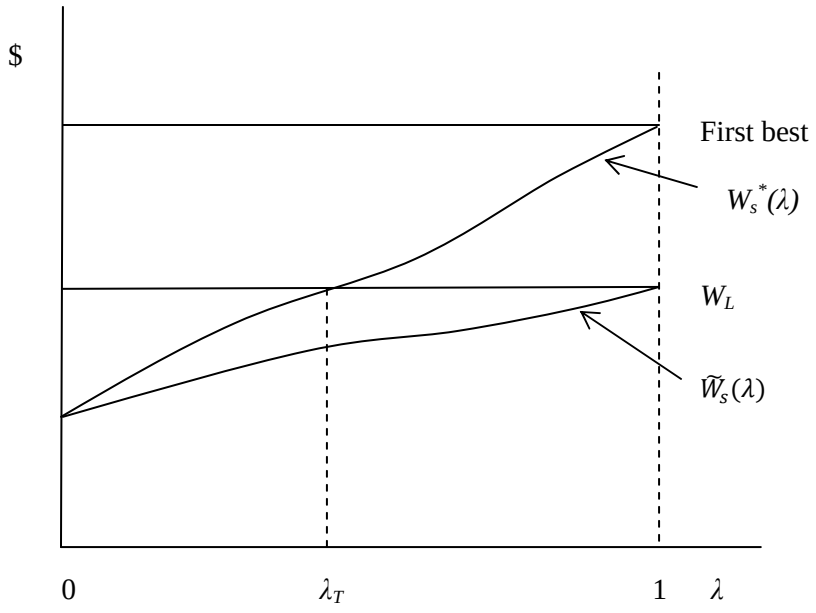

Figure 2. Comparison of strict liability and regulation for different values of λ.

Table 1: Summary of results.

Consumer harm:	Consumer perceptions of risk: Accurate	Consumer perceptions of risk: Inaccurate
Same	Regulation and liability equally efficient	Liability preferred over regulation
Varies	Regulation preferred over liability	Liability preferred if $\lambda<\lambda_T$; regulation preferred if $\lambda>\lambda_T$