**Budget-Constrained Injurers and the Law of Torts**

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**Abstract**

We discuss the optimal tort regime for entities such as the state and charitable institutions, whose activities are conducted under a binding budget constraint. We show that the optimal level of care for such entities is lower than the optimal level applicable to ordinary injurers. We further demonstrate that the social optimum can be induced by a lenient *Gross Negligence* standard, and that *Ordinary Negligence* and *Strict Liability* both induce inefficient behavior. These conclusions are robust to variations in the size of the budget, in the magnitude of the fee charged for the service, and in the distribution of consumers' valuations of the service.

# I. Introduction

It is a foundational principle in the standard model of tort law that precautions are to be encouraged as long as they reduce expected harm by more than their cost. This paper, however, identifies an important class of cases in which this principle should not apply. These cases are ones in which activities are pursued subject to a *binding budget constraint*.

The state is a prime example of an agent acting within a binding budget. The state may offer, for instance, medical services to the public, which are welfare-enhancing overall, but that might also produce harm when a treatment goes amiss. Charitable organizations provide another important example. A soup kitchen, funded by donations, provides food for the destitute, but may also cause harm by inadvertently serving stale food. We investigate the optimal tort regime that ought to apply to such entities when they cause injury. For ease of reference, we refer to them collectively as “Budget-Constrained Injurers”, or “BCIs.”

The policy-relevant distinction between BCIs and other injurers is demonstrated by the following two examples. In both examples, a precaution might be taken to reduce expected harm, and the question is whether taking the precaution would be socially desirable. Whereas in the first example harm is caused by an “ordinary” injurer, i.e., one not acting within a binding budget, in the second example it is caused by a BCI.

*Example 1: Ordinary Injurer*

A private clinic offers dental services. When treating its patients, it must apply anesthesia using one of two types of injections, A or B. Injection A costs 1 and causes an expected harm of 10. Injection B costs 4, and reduces expected harm to 5. If no accident occurs, patients derive a value of 12 from the treatment. The clinic uses the A injection, and Lisa, after suffering an injury, sues the clinic for failing to use the B injection.

Pursuant to the ordinary analysis of efficient tort liability, the clinic should indeed be deemed negligent: By investing 3 more in injection B, it could reduce expected harm by 5. The imposition of liability would optimally induce the clinic to make the desirable choice.

Now suppose that the injurer operates under a binding budget.

*Example 2: Budget-Constrained Injurer*

A public clinic provides free dental services to patients with limited means. It may use either injection A or B, as in Example 1. If no accident occurs, patients derive a value of 12 from the treatment. The clinic operates under a fixed budget of 1000, which is insufficient to serve all those who seek treatment. The clinic uses the A injections, and Lisa, after suffering an injury, sues the clinic for failing to use the B injection.

Despite the similarity between Examples 1 and 2, the clinic in the latter case should not be deemed negligent. Although in both cases injection B would reduce expected harm by more than the difference in cost, the clinic in the second example should use injection A. If injection A is used, the budget allows for treatment of 1,000 patients, who derive an aggregate expected value of 2,000 (=12,000-10,000). If injection B is used, only 250 patients can be treated, obtaining an aggregate expected value of 1750 (=3000-1250). Thus, social welfare is greater if the public clinic uses injection A. Although in both cases an additional investment of 3 would reduce expected harm by 5, the investment should be made in the first case but not in the second.

The general point demonstrated by these examples is that under a binding budget the optimal investment in care is lower than absent such a constraint. The binding budget implies that the service cannot be optimally provided across both dimensions of production and care: If budget funds are used to undertake optimal precautions then the level of production would inevitably remain sub-optimal. Likewise, if the level of production is set optimally, care would be inadequate. The constrained budget does not allow for both dimensions to be set optimally at the same time. The most one can do under a binding budget is to balance the two, such that the social value of investment in either of the two dimensions is equated at the margin. At the optimum, both production and care will be set at lower levels than if the activity had not been subject to a binding budget.

Two policy implications follow: *First*, tort law should incentivize different precautionary behavior for BCIs and for ordinary injurers. In particular, BCIs should be required to invest less in care, in view of the tradeoff that they face between production and care under a binding budget. *Second*, the tort regime applied to BCIs should be one in which liability is not imposed in equilibrium. When a marginal budget dollar is channeled to liability, the value conferred to the recipient is exactly a dollar. In contrast, if the dollar remains within the budget and channeled to either production or care, its social worth exceeds a dollar. Thus, other things equal, greater welfare is realized if liability is not imposed in equilibrium.

The combination of these two observations underlie the conclusion that BCIs ought to be governed by a negligence regime, in which the standard of care is more lenient than the standard applied to ordinary injurers. The reduced standard would incentivize lower investment in care, and as the standard would be met in equilibrium, liability would ultimately not be imposed. We refer to such a regime as one of *Gross Negligence*.[[4]](#footnote-5)

A *Gross Negligence* regime would generally be superior to both *Strict Liability* and *Ordinary Negligence*. It would outperform *Strict Liability*, because it would induce a more efficient level of care and would not result in the imposition of liability in equilibrium. It would outperform *Ordinary Negligence*, because under *Ordinary Negligence* the BCI would effectively be forced to choose between meeting the ordinary standard, in which case investment in care would be excessive, and failing to meet the standard, in which case it would bear inefficient liability. Whatever the choice, a more efficient outcome would be attained under a regime of *Gross Negligence.*

The notion that entities such as the state and charities should be held to lower standards is not foreign to tort law doctrine. In fact, historically, both have enjoyed full immunity from liability. Although the immunities have since been largely limited, some exceptions remain.[[5]](#footnote-6) Legal scholarship has explained the special status of the state and charities primarily on the basis of a positive externality rationale. Namely, the stated concern was that liability might deter not only the harmful aspects of the activity, but also the positive externalities that the activity entails. Thus, for example, the state and charities might restrict their operations to low-risk activities, or even cease certain operations altogether, so as to reduce exposure to liability (Tremper (1991); Jeffries (1998); Gillette & Stephan (2000), Horwitz and Mead (2009)). In the case of the state, the threat of liability might distort the execution of discretion (Epstein, 1978; Epstein 1997: 369-380). In the case of charities, liability might drive institutions to bankruptcy, to the detriment of those relying on their services (Tremper 1991).

In a similar vein, De Geest (2012) observes that when an activity produces both benefit and harm, and the cost of avoiding the harm is externalized, then partial or full tort immunity may result in improved incentives. Thus, for example, when a firefighter uses high-pressure water to put out a fire, he must balance the benefit of rapidly extinguishing the fire with the cost of water damage. If exposed to liability for the water damage, he might tend toward inaction: Doing nothing is a form of precaution against water damage, and taking that precaution would shield him from liability. But as the cost of doing nothing (in terms of fire damage) is externalized, the firefighter would resort to inaction too often. Thus, tort immunity can be viewed as a means to counter the tendency for excessive precautions, when the cost of those precautions is externalized. (See also (Spitzer (1977), Mashaw (1978), Schuck (1983), Jeffries (1998)).

More generally, existing accounts of immunity are founded on the observation that the positive externalities conferred by both the state and charities create a divergence between private and social interests. Holding the state and charities liable for the harmful aspects of their activities might overly chill their incentive to engage in them in the first place, to the detriment of those who would otherwise enjoy the externalized benefits. A rule of partial or complete immunity thus serves as a means to better align the private interest with the social one.

The present analysis differs from existing accounts in that the problem examined here is not at all a problem of misaligned interests and positive externalities. Under the framework we consider, the decision to engage in the desirable activity is given exogenously, and so the concern for inaction does not arise. The central point stressed here is that when an activity is conducted under a binding budget*, the socially optimal level of care itself is altered*. Accordingly, even if the BCI’s sole purpose is to maximize social welfare, it must exercise *less* care compared to an ordinary injurer. Holding the BCI to a lower standard allows it to achieve a more efficient balance between the different uses of a binding budget.

The paper proceeds as follows. **Section II** discusses the governmental and charitable immunities, and their relation to the present argument. **Section III** develops our model. We show that the claim in favor of a *Gross Negligence* regime is robust to a variety of settings and policy alternatives. We show that when the BCI seeks to maximize social welfare, alternative regimes of *Ordinary Negligence*, *Strict Liability* or *Capped Liability* will produce inferior results, preventing the BCI from fulfilling its social purpose. These results are robust to a variety of alternative assumptions: They hold irrespective of the size of the BCI's budget; of whether its services are provided for free or sold for a charge; and of whether consumers’ valuations of the service are taken to be homogeneous or heterogeneous.We further show that the superiority of *Gross Negligence* generally survives even when the BCI is assumed to pursue a policy departing from the social interest, such as when its behavior is affected by agency problems. **In Section IV** we take up a possible challenge to our argument. As consumers of BCIs tend to be disproportionally poor, the idea of applying a lenient standard to BCIs might be viewed as objectionable on grounds of distributive justice. We demonstrate, however, that the lenient standard in fact serves the interest of consumers themselves, as it optimally balances the utility they derive from increased precautions and from increased production. Thus, rather than undermining their welfare, a lenient standard would promote it. **Section V** concludes.

**II. Governmental and Charitable Immunities**

Under the traditional common law, both the state and charitable organizations were exempt from tort liability. Sovereign immunity was originally premised on the precept that “the king can do no wrong.” It appeared natural to the kings and jurists of the feudal middle ages that the sovereign—the maker of the law—could not himself be bound by its coercive powers.[[6]](#footnote-7) Although the justifying principle is now obsolete, the immunity still survives with respect to some functions of government. At the federal level, as well as in most states, “discretionary” functions of government remain immune.[[7]](#footnote-8) At the local government level, activities are immune if designated as “governmental” as opposed to “proprietary.”[[8]](#footnote-9) Today, however, the justification for immunity rests on different grounds. It is thought that, although the government is capable of wrongdoing, the judicial branch should not interfere with the powers granted by Congress to the Executive.[[9]](#footnote-10) Moreover, government should not be burdened by litigation over numerous daily decisions;[[10]](#footnote-11) and the threat of liability should not be allowed to bias the judgment of government officials.[[11]](#footnote-12) Immunity does not extend, however, to activities in which the government acts within its private capacity. When supplying services that are of similar character to those offered by private providers, it is equally exposed to liability as private producers when causing harm.[[12]](#footnote-13)

The distinction between the different capacities of government has proven difficult to apply.[[13]](#footnote-14) For even when a government service could alternatively be supplied by a private entity, the decision to supply it by the government involves a choice of policy. In particular, it involves a choice as to how to deploy public resources—a manifestly governmental function.[[14]](#footnote-15) Thus, to take one recurring example, a question arose as to whether a public swimming pool, operated by a municipal entity, should be accountable for injuries sustained by bathers. Is the action “proprietary” because swimming pools are often, even typically, operated by private providers? Or is it “governmental” because any investment in maintenance and safety involves a budgetary decision that implicates governmental discretion? While some jurisdictions apply full immunity in these cases, others treat the municipality as they would any other injurer.[[15]](#footnote-16)

The analysis developed here is pertinent to such cases. Although swimming pools are operated by both private and public providers, the two should not be held to the same standard of care. Public providers should be subject to a more lenient standard, or otherwise the threat of liability would overly restrict the availability of their services. The tradeoff between production and care, arising only under a binding budget, warrants differential treatment even though the activity in question is substantively the same.

Charities, like governments, have also historically enjoyed immunity under the common law. The stated rationale was that imposition of liability would wrongly divert the charity’s funds from their intended purpose.[[16]](#footnote-17) From an *ex ante* perspective, it addressed a concern that the threat of liability would dissuade donors from committing funds to charities.[[17]](#footnote-18) Furthermore, it was thought that recipients of charity services should be assumed by implication to accept them “as is”, while waving the right to sue in case of injury.[[18]](#footnote-19)

The charitable immunity was repudiated in England two decades after its inception, but remained in force for longer in the United States.[[19]](#footnote-20) However, with increased dissatisfaction in the United States as well, it was gradually eroded by various exceptions and limitations, until it was eventually abolished.[[20]](#footnote-21) The charity’s good intentions were eventually viewed as insufficient reason to shield it from liability when it negligently inflicted harm. Furthermore, courts reasoned that the dilemma concerning charities could be resolved by requiring the purchase of liability insurance. If charities are insured and immunity is lifted, then arguably both policy objectives could be attained at once: on the one hand, victims would not be denied compensation, and on the other, the charity’s budget would not be depleted.[[21]](#footnote-22)

This latter argument, however, overstates the role of insurance in settling the issue. If the charity is to acquire liability insurance, it must pay a premium of at least the expected harm. Thus, in the long run, the budget would not be any less burdened by the purchase of insurance than if the charity faced ordinary liability. The real policy question is whether it is socially desirable to have the charity face the same *precautionary demands* as ordinary injurers, given the constraint on its budget. With insurance or without it, the constrained budget implies that charities should exercise a lower level of care compared to ordinary injurers. Hence, requiring the acquisition of insurance without changing the standard will not facilitate the desirable outcome.

# III. The Model

We consider a risk neutral producer, offering a service that may inflict harm. The producer’s per-unit cost is given by  where  is the fixed cost of producing a single unit and  is the per-unit cost of care. Each unit confers a benefit  to consumers, and an expected loss of, where the latter is strictly decreasing and convex. We initially assume that the benefit is homogeneous among consumers, but later also consider the case in which it is heterogeneous.

## *Private Producer*

Suppose first that the service is offered by a private producer whose chosen level of care is observed by consumers. Assuming a perfectly competitive market, transactions are then formed if and only if they yield a positive net value, that is, if production is efficient -

 (1)

It is assumed that there are maximum and minimum costs of care,  such that production is efficient (condition (1) holds) if and only if . Hereinafter we limit attention to costs of care that satisfy this condition. Maximizing social welfare over *c*, we obtain the familiar condition for the optimal level of care, *c\**:

. (2)

When consumers observe the selected level of care, producers choose *c\** even under a *No Liability* regime, to maximize the overall surplus. If, alternatively, consumers cannot observe the level of care, or if they can only observe the average level of care, then a liability regime might be necessary (Shavell (1987:51-6)). Under an *Ordinary Negligence* rule the socially optimal standard would be *c\**, and producers would exercise due care. Similarly efficient results would obtain under *Strict Liability* (Shavell (1987:67)).

## *Budget Constrained Injurers (BCIs)*

Now consider the case in which the service is offered by a BCI. We initially assume that the BCI offers the service free of charge, and normalize the number of units demanded when  to 1.[[22]](#footnote-23) The BCI operates under a fixed budget constraint . The budget is assumed to be binding, that is, . The budget is further assumed to be exhausted, and to have no alternative uses other than to finance production, care and possibly liability payments. Hence, the socially relevant question is how to optimally allocate the available budget between these three potential uses.

We begin by showing that the socially optimal level of care is lower for a BCI than the optimal level for a private producer. We then compare social welfare under five alternative liability regimes: *Gross Negligence*, *Ordinary Negligence, Strict Liability,* *Capped Liability*[[23]](#footnote-24)and *No Liability*. We show that, among the above-mentioned alternatives, a BCI seeking to maximize social welfare would be able to do so *only* under the *Gross Negligence* and *No liability* regimes. If any of the alternative regimes is adopted, the BCI would be prevented from realizing the social optimum.

### *Defining the Social Optimum*

Consider a BCI, endowed with budget , investing *c* in care, and bearing liability of . The number of units it can produce is then given by , and social welfare, denoted , is accordingly given by:

 (3)

It should be initially observed that for any level of care, it is socially optimal for the BCI to bear *no liability at all*.[[24]](#footnote-25) Intuitively, the channeling of budget funds to liability is inefficient because a dollar directed to liability is worth a dollar to its recipient, but under a binding budget it would alternatively produce more than a dollar’s worth if used in production. Hence, liability is socially costly in that it inefficiently substitutes productive activity with direct transfers.

Thus, setting , the BCI should be driven to maximize:

  (4)

Differentiating (4) with respect to *c*, we obtain the following condition for the socially optimal level of care, :

 , (5)

where the inequality follows from the efficiency of production (condition (1)). By the convexity of , .

Intuitively, (5) requires that the marginal dollar yield the same value when channeled to production and to care. That value, in turn, must exceed a dollar: As production is cost-efficient, a dollar diverted away from production reduces consumer utility by more than a dollar; hence, for such a diversion to be desirable, it must also reduce expected harm by more than a dollar.[[25]](#footnote-26) Hence, the optimal level of care for BCIs must be set lower than for ordinary injurers.

The following Proposition summarizes this result:

**Proposition 1:** *For the social optimum to hold, BCIs must bear no liability and select a level of care equal to* *. This level is lower than , the optimal level for ordinary injurers.*

1. *The Optimal Liability Regime*

We now examine the effect of alternative liability regimes assuming that the BCI seeks to maximize social welfare. As shown next, all liability regimes except for *No Liability* and *Gross Negligence* produce inefficient outcomes, preventing the BCI from maximizing the social good.

This result follows immediately from Proposition 1. Under both *Gross Negligence* and *No Liability*, the BCI indeed selects the optimal level of care and bears no liability, which yields the optimal result. In contrast, the result under *Strict Liability* is sub-optimal.[[26]](#footnote-27) One reason is that under *Strict Liability*, direct transfers substitute for productive activity that would carry greater social value. A second reason is that *Strict Liability* induces excessive investment in precautions, as it inefficiently distorts the relative social cost of production and care. Namely, as liability attaches to the decision to invest less in care, but not to the decision to invest less in production, it prevents the BCI from equating the social values of production and care at the margin.[[27]](#footnote-28)

*Ordinary Negligence* (with or without *Capped Liability*) also leads to inefficiency, since it forces the BCI to choose between investing excessively in care (so as to meet the required standard of ), and bearing inefficient liability (if deciding to invest less than ). As established in Proposition 1, either course of action leads to sub-optimal outcomes.[[28]](#footnote-29)

These conclusions are summarized in the following Corollary.

**Corollary 1:** *When BCIs seek to maximize social welfare, the socially optimal outcome is realized under the No Liability and Gross Negligence regimes, but cannot be realized under Strict Liability or Ordinary Negligence with or without Capped Liability*.

## *(c)* *Extensions*

We now turn to further investigate the properties of a *Gross Negligence* regime, as well as the robustness of its optimality to varying assumptions. We begin by examining whether the size of the BCI's budget affects the optimal standard. We find that the optimal standard does not depend on the size of its budget, and hence the same (lenient) standard should apply to BCIs, whether big or small. This result bears important practical implications, as it implies that courts need not inquire into the magnitude of the BCI’s operation in order to determine negligence. We further note, however, that the optimal standard does depend on the value of the service to consumers. The more valuable the service is, the more lenient the standard ought to be.

We further examine whether the superiority of *Gross Negligence* remains robust to different environments in which the BCI operates. Namely, we consider whether BCIs charging participation fees should be treated differently from ones that offer their services for free. We also examine whether the general results stand when the value of the service varies among consumers, as opposed to the assumption employed so far, under which the value is homogeneous. In both situations we find that the desirability of a lenient standard remains intact, and under certain conditions it is even reinforced.

Finally, we examine the case in which agency problems may cause BCIs to pursue policies that depart from the social optimum. We find that under fairly general conditions, the superiority of *Gross Negligence* remains robust in that setting as well.

1. *The Standard of Care's Sensitivity to Budget Size and to the Value of the Service*

The independence of the optimal standard from the size of the budget follows directly from the first-order-condition defining the optimal standard (see (5)). We state this result in the following Corollary, and then discuss its underlying intuition.

**Corollary 2:** *The optimal standard of care* *does not depend on the size of the budget* *, as long as it is binding.*

The independence of the optimal standard from the size of the budget stems from the fact that the allocation problem facing the BCI—of whether to invest in production or in care—is replicated with each additional unit the BCI produces. For any given investment in care, every unit confers the same benefit to consumers and inflicts the same level of harm. Thus, for every unit, the tradeoff between production and care reemerges in identical form. Additions to the budget do not alter the nature of that tradeoff within a given unit, and thus do not alter the optimal level of care.

This result implies that courts, when identifying the socially desirable level of care, need not probe into the magnitude of the BCI’s budget. As long as the budget is binding (in the sense that it does not allow a BCI to meet all efficient demand) the magnitude of the BCI’s operations should not affect the optimal level of care. Regardless of size, all BCIs should be held to the same standard.

The standard does vary, however, with the value the service confers to consumers. The greater the value, the more lenient the standard ought to be. This result, too, directly follows from (5).

**Corollary 3:** *The greater the value of the service v, the lower is the optimal standard of care* .

This result too is an implication of the tradeoff between the conflicting objectives of production and care. If consumption value is higher, then more resources ought to be diverted from care to production. Hence, as the value of consumption rises, the relative desirability of investment in care falls.

1. *Participation fees*

Many BCIs charge a price for their services. A public swimming pool may require an entry fee; a soup kitchen may levy a service charge. The price does not cover the full cost of production, and hence, in this sense, the provider is still a BCI. However, payment is a condition to obtaining the service. Thus, providers who levy a charge may be viewed as “hybrids” between pure BCIs and private providers.

The question examined in this section is whether the imposition of a fee affects the optimal standard of care. A natural conjecture would perhaps suggest that the optimal standard should lie in between the optimal standard for private producers and the respective standard for pure BCIs: If by charging a fee the BCI draws “closer” to the private provider, then the applicable standard should presumably increase accordingly. We show, however, that this is not the case: Depending on the form of participation fee used, the optimal standard of care will either remain the same as that applied to pure BCIs, or will be further lowered.

We consider two possible forms of participation fees: One is a flat fee, charged with any unit provided; the other is a fee charged as a percentage of cost. In both cases, the proceeds are assumed to be invested back in the activity, thus enlarging the BCI’s budget. We consider the two fee types in turn.

*Flat Fee*

Under a flat participation fee, consumers are charged a fixed rate per unit purchased. Consequently, production of a single unit does not detract the entire cost of  from the budget, but rather the smaller amount of  where  denotes the fee. We assume that despite the fee, the budget continues to be binding for any level of care higher than , that is, .[[29]](#footnote-30)

Assuming that no liability is incurred, the welfare induced by the available budget is given by

 (6)

and hence,

 (7)

As this result indicates, the optimal level of care is even lower if the BCI charges a fee than if it provides the good for free. Intuitively, the reason is that the fee is collected as a function of the *number* of units sold, not as a function of the amount invested in care. Thus, if a budget dollar is channeled to production, the BCI will re-collect part of that dollar by charging an additional fee; but if the dollar is channeled to care, then the number of units sold will remain unchanged, and no additional fee will be collected. Thus, the fee changes the relative cost of production and care. As investment in care becomes relatively more costly, the optimal investment in care falls.

*Fee Set as a Percentage of Cost*

Consider next the case in which the fee is charged as a fixed percentage of cost, so that consumers are charged  for each unit of the good, where . We again assume that the budget is binding for any level of care higher than , that is, .

Social welfare is given by:

, (8)

and the first-order-condition is accordingly:

. (9)

Thus, in this case the fee will have no effect on the optimal level of care, which will remain  (see (5)). Intuitively, a fee levied as a percentage of cost has no impact on the optimal level of care because it keeps the relative cost of production and care unchanged. The fee is collected regardless of whether the marginal dollar is channeled to production or to care, as in both cases cost increases by a dollar. As relative prices are not affected, neither is the optimal investment in care.

In sum, the notion that BCIs charging a participation fee should be held to a stricter standard than pure BCIs is not generally supported. As long as a tradeoff exists between production and care, the fundamental point remains that at the optimum, the marginal budget dollar can be used produce more than a dollar’s worth in both production and care. Hence, the general reasoning underlying the application of a lenient standard will remain intact.

1. *Heterogeneous Value*

We have so far assumed that consumers share the same valuation of the service. Consider now the alternative case in which valuations are not necessarily uniform. When consumer valuations are allowed to vary, a potential problem of *inefficient allocation* may arise: Assuming that the BCI cannot screen consumers on the basis of their valuation, it cannot ensure that those who ultimately obtain the service are those who derive the greatest value from its consumption. Accordingly, the desirability of a legal standard should now be measured not only with regard to its effect on choices of production and care, but also with regard to its effect on allocative efficiency.

Against this background, we reexamine the desirability of a lenient standard in the heterogeneous case. We find that the optimal standard remains lenient, and that the added consideration of allocative efficiency actually drives it further down. As in the homogeneous case, lowering the standard boosts the BCI’s production; but uniquely to the heterogeneous case, it also promotes efficient sorting of consumers, which in turn raises the average valuation of consumers who ultimately gain access to the service.

The efficient sorting effect is generated for the following reason: When the standard is lowered, all consumers experience a decline in the overall benefit from consumption. Consequently, for some consumers, obtaining the service ceases to be desirable, and hence they exit the market. Those consumers are not drawn randomly; they are those whose valuations of the service were the lowest to begin with. Hence, a decline in the level of care raises the average valuation of consumers who continue to be served. This, in turn, suggests that the optimal level of care when valuations are heterogeneous will be yet lower.

To develop this result formally, consider a population with heterogeneous valuations, where each consumer  values the service by . Assume that the mean valuation equals , the consumers' valuation in the homogeneous case.

The overall utility of consumer  is given by . If  is lowered,  falls, and therefore consumers with the lowest valuations may choose to exit the market. As a result, the (conditional) mean valuation among those who remain will rise.

We may thus define the mean valuation as a function , where . Note that for any level of , , as for any  it is possible that some low-valuation consumers have exited the market.

Social welfare can then be derived as the number of units produced, multiplied by the mean valuation conferred by those units. Assuming that the budget is binding:

 (10)

The first order condition then yields:

 (11)

where  denotes the socially optimal level of care when valuations are heterogeneous.

This result indeed establishes that the optimal level of care is higher when valuations are homogeneous than when they are heterogeneous with an equal mean. Two reasons underlie this result: *First*, in the heterogeneous case, lowering the level of care leads to an efficient sorting effect, not applicable in the homogeneous case. Namely, lower care induces exit by low-valuation consumers, which in turn raises the average value of the service (recall that ). *Second*, under , the optimal level of care in the heterogeneous case, some consumers may have already exited the market, implying that the average value of a produced unit is higher than in the homogeneous case (). As production is thus more valuable relative to care in the heterogeneous case, less funds ought to be channeled to care at the optimum.[[30]](#footnote-31)

Thus, relaxing the homogeneity assumption does not alter the fundamental result that BCIs should be subject to a lower standard of care; to the contrary, the result is further reinforced.[[31]](#footnote-32)

1. *Agency Problems*

The discussion thus far establishes that the maximal welfare attainable under a *Gross Negligence* regime exceeds that attainable under the competing alternatives: *Strict Liability, Ordinary Negligence* and *Capped Liability*. Thus, provided that the objective of BCIs is to maximize social welfare, a regime of *Gross Negligence* should be preferred.

The presumption that BCIs indeed seek to maximize the social interest seems tenable in a broad array of contexts. Charities are altruistic institutions, formed with the purpose of promoting the social good. The state, too, is entrusted with the task of benefitting the public. However, it is also clear that individuals running charities and government agencies often have personal stakes in the policies of the institutions they control. For instance, an administrator may seek to minimize liability so as to avoid personal damage to reputation; or she may seek to maximize output—to engage in “empire building”—to maximize the visibility and appeared importance of her controlled enterprise.[[32]](#footnote-33) Thus, BCIs’ policies may sometimes diverge from their declared function. Hence, from a policy perspective, it is meaningful to examine to what extent the superiority of *Gross Negligence* survives the possibility of agency problems within BCIs. This section therefore compares *Gross Negligence* with its alternatives, assuming that the private agenda of BCI administrators may depart from the institution’s affirmed purpose.

Our conclusion is that regardless of the nature of the agenda advanced by BCI administrators, *Gross Negligence* retains its unequivocal superiority to both *Ordinary Negligence* and *Strict Liability*. Hence, the desirability of moving from the present tort regime (of *Ordinary Negligence*) to the suggested regime (of *Gross Negligence*) remains robust to *any* divergence between private and social optima. We also show that *Gross Negligence* will often outperform *Capped Liability* and *No Liability*, however that determination is more sensitive to detail and will in some cases be ambiguous.

The conditions required for the results to hold are quite minimal. Namely, we assume that BCIs disfavor liability as such, and are therefore willing to commit some positive portion of the budget for the purpose of reducing liability. We further assume a version of monotonicity in preferences: When no liability is imposed, if the BCI must choose between two levels of care greater than its most preferred choice, the BCI is assumed to choose the level closer to the one it most prefers. Finally, since the budget is intended solely for the benefit of consumers, we regard the private benefits administrators extract by deviating from the social optimum as socially illicit, and thus do not count them as part of social welfare.

The formal proof of the results is relegated to the Appendix. In the following we state the Proposition and comment on its underlying intuition.

**Proposition 2:** *If BCI administrators’ private agenda is potentially misaligned with the social optimum, then –*

1. *A Gross Negligence regime weakly dominates both Ordinary Negligence and Strict Liability, regardless of the private agenda pursued by BCI administrators.*
2. *If under a Gross Negligence regime BCI administrators select a level of care , then Gross Negligence weakly dominates both No Liability and Capped Liability. If, however, they select , then the comparison between Gross Negligence and the above-mentioned regimes is ambiguous.*

To illustrate the underlying intuition, consider first the comparison of *Gross Negligence* with *Ordinary Negligence* and *Strict Liability*. As the nature of the private agenda pursued by BCI administrators is not restricted, the selected level of care under *Gross Negligence* may be optimal, inadequate, or excessive. We consider each of these options in turn.

If under *Gross Negligence* , then care will be optimal and no liability will be incurred. In that case, *Gross Negligence* will dominate *Ordinary Negligence* and *Strict Liability*, as under both alternatives, either care will be excessive or liability will be incurred (or both).

If under *Gross Negligence* , then care will be excessive and the BCI will bear no liability. The result under *Strict Liability* will be worse, as *Strict Liability* will induce greater investment in care and result in the imposition of liability. *Ordinary Negligence* will either yield the same result as *Gross Negligence*—particularly when ; or an inferior result*—*particularly when  (as then *Ordinary Negligence* will either induce further investment in care, or result in the imposition of liability).

Finally, If under *Gross Negligence* , then care will be inadequate and liability will be incurred. However, since all three regimes will apply similar liability when , all will ultimately lead to the same outcome.

The combination of these observations yields the first part of the Proposition, namely that *Gross Negligence* weakly dominates both *Strict Liability* and *Ordinary Negligence*.

The comparison with *No Liability* and *Capped* *Liability*, yields a less definitive result. This can be observed by distinguishing again between the three possible cases considered above.

If, under *Gross Negligence* ** , then care will be optimal and no liability will be incurred. *No Liability* will then generate the same outcome. *Capped Liability* will yield a strictly inferior outcome, as it will force the BCI to either increase its investment in care, or bear liability.

If, under *Gross Negligence*,  then care will be excessive and no liability will be borne. The same result will obtain under *No Liability*. *Capped Liability* will produce a similar result if ; but if  the result will be inferior (as then either liability will be imposed, or more care will be taken to avoid liability).

Finally, if under *Gross Negligence* , then care will be inadequate and liability will be incurred. In this case two countervailing effects impact the comparison to the alternative regimes: First, as liability will be lower under the alternatives, they may induce higher welfare overall. But second, as BCIs disfavor liability, *Gross Negligence* may induce a higher level of care, which will enhance social welfare. As demonstrated in the Appendix, any of these countervailing effects may dominate.

Thus, in summary, if the nature of the agency problem is such that administrators are not deterred by the prospect of liability, then *No Liability* and *Capped Liability* bear a relative advantage, in that they more effectively prevent leakage of budget funds to liability. This may perhaps provide some justification to the historic application of immunity, or to present-day laws of capped liability. With that said, the ultimate significance of this advantage largely depends on the particulars of the case, rendering its practical import difficult to assess.

More significant is the result that irrespective of what BCIs seek to maximize, *Gross Negligence* outperforms both *Ordinary Negligence* and *Strict Liability*. That result further casts into question the prevailing policy, which largely equates the standard applied to BCIs with that applied to ordinary injurers.

# IV. Bias Against the Poor?

In this final Section we take up a possible objection to the notion that BCIs ought to be held to a lenient standard, namely a concern grounded in distributive justice. Consumers of charitable institutions, as well as many government services, tend to be disproportionally poor. It is often the very purpose of the BCI’s enterprise to ensure that those with limited means gain access to essential services. Thus, if BCIs are required to invest less in precautions, as the analysis here suggests, then the implication is that the poor would remain more exposed to harm than the wealthy. Thus, even if the result is efficient, such disparate treatment by the legal system may be viewed as being markedly unjust.

We believe, however, that such an objection would be misplaced. The lower standard applied to BCIs is not merely efficient in the broad social sense, but also optimal from the standpoint of BCI consumers themselves. The lenient standard is defined by the level of care for which consumers capture the same value when a marginal dollar is channeled to production and to care. Thus, requiring BCIs to increase investment in care would only cause consumer welfare to fall, as the loss emanating from reduced production would by definition outweigh the benefit from increased care. Thus, behind a veil of ignorance, in which all consumers face equal probability of obtaining access to the service, all would prefer that the standard be set at the optimal level applicable to BCIs, rather than that applicable to ordinary injurers.[[33]](#footnote-34)

Allocating more budget funds to care is therefore not a viable instrument by which to enhance the welfare of BCI consumers. To raise consumer welfare, one must increase the size of the budget itself rather than change the way it is deployed. Of course, in the case of the state, the size of the budget is a choice variable. The government, through its taxation policy, determines the scope of its own operations. However, since taxes come at a substantial efficiency cost, it is not obvious that they should be raised to the point where the state budget ceases to be binding.[[34]](#footnote-35) In any event, it is in the domain of tax policy, not tort law, that the conflict between efficiency and distributive justice may reasonably arise. As long as taxes are set at a level for which budgets remain binding, deviating from the lenient standard would not only undermine efficiency, but also diminish the welfare of BCI consumers.

# V. Conclusion

In an optimal tort system, ordinary injurers and Budget-Constrained Injurers (BCIs) should not be subject to the same demands. A binding budget alters the economic cost of care, and therefore alters its socially desirable level. Whereas for ordinary injurers a dollar invested in care costs a dollar, for BCIs its cost is given by the dollar’s alternative value if channeled to production. As that value exceeds a dollar, diverting it away from production to care costs more than a dollar.

Two conclusions follow from these observations: First, that the optimal standard of care for BCIs should be set at a lower level than for ordinary injurers; second, that BCIs should not be made to bear liability in equilibrium. As a budget dollar yields more than a dollar’s worth when used in production, it is better spent in production than as a liability transfer.

In the history of tort law, the approach toward BCIs has moved ambivalently between two extremes. Whereas in the past BCIs were entirely exempt from liability, today they are largely required to meet the same burden as ordinary injurers. The present analysis suggests that a midway approach may well dominate both of those extremes. Some liability may be required to deter BCI administrators from behavior that is undesirably negligent. However, the standard should require less of BCIs, and liability should apply only if the lenient standard is violated. Requiring the same from BCIs and private injurers is likely to undermine the welfare of consumers—the very class whose interests the law seeks to protect.

# APPENDIX

**Proof of Proposition 2:**

To prove Proposition 2, we next assume that the BCI seeks to advance a private agenda, not necessarily aligned with the social interest. Since the budget is allotted by its funder solely for the purpose of benefitting consumers, we regard any private gains extracted by administrators as socially illicit, not to be counted as part of social welfare. Under these assumptions, we compare social welfare under different legal regimes.

Let and  denote the level of care preferred by the BCI under *No Liability* and *Strict Liability*, respectively. We assume that the BCI disfavors liability as such, and willing to expend a positive part of the budget in order to avoid liability. Thus, in particular,. We also assume that if the BCI is not held liable for losses, then for any  and , if , the BCI prefers  to . In other words, assuming that no liability is imposed, if the BCI must choose between two levels of care greater than the BCI’s most preferred level
(), then it selects the one closer to its most preferred level.

In view of our assumption that , the relation between *,*  and may take three possible forms. Accordingly, we distinguish between the following three cases:

1. 
2. 
3. 

We next establish three lemmas, from which proposition 2 follows.

**Lemma 1:**

*Under a Gross Negligence regime—In case (1) the BCI selects  and incurs no liability; in case (2) it selects  and incurs no liability; and in case (3) it selects either  and incurs liability, or  and incurs no liability.*

**Proof**:

Case 1 follows from the definition of . To prove the claim concerning case 2, we show that both  and  are dominated by .  is dominated, since for any level of care below, liability is incurred, and therefore (with liability imposed) would have been preferred. Note, however, that since the BCI disfavors liability, it would prefer  without liability even more. But since under liability is not imposed, the BCI further prefers , being closer to the most preferred level of care absent liability (). For the same (latter) reason, the BCI always prefers  over any level of care exceeding . Thus,  is dominated as well.

As for case 3, the selected level of care depends on the intensity of the BCI’s aversion to liability. If it is low, then the BCI selects the privately optimal level of care given liability, namely . If its disfavor of liability is more intense, it may opt to increase the level of care so as to avoid liability. Among the care levels under which liability is not incurred, it opts for the level closest to , namely . 

We next wish to compare the privately optimal choice under a *Gross Negligence* regime and under alternative liability regimes. In particular, we compare *Gross Negligence* to (a) *No Liability*; (b) *Strict Liability*; (c) *Ordinary Negligence* (in which the standard of care is set at ); and (d) *Capped Liability* (in which a negligence standard is set at , but expected liability upon failure to meet the standard is lower than expected harm.)

**Lemma 2**: In cases (1) and (2), *Gross Negligence* weakly dominates all alternative regimes.

**Proof**:

For each of cases (1) and (2), we compare the social desirability of the BCI’s choice under the different regimes.

*Case (1):*

Under *Gross Negligence* the BCI selects  and incurs no liability. Under *No Liability* the same outcome is reached (by definition of ). Under *Strict Liability*, it selects and incurs liability. The superiority of *Gross Negligence* over *Strict Liability* is shown by transitivity: (1) If no liability were incurred under both and , then  would have been socially superior, as  is convex and  is closer to . (2)  produces greater welfare if liability is not incurred than if it is, due to the efficiency of production. [[35]](#footnote-36) Hence, the result under *Gross Negligence* ( without liability) is socially superior to that under *Strict Liability* ( with liability incurred).

Under *Ordinary Negligence*, the BCI selects if  (as then no liability is incurred and is closer to ), and may select either  or  if  (depending on the intensity of its aversion to liability, as above). If is chosen under *Ordinary Negligence*, then the result under *Gross Negligence* ( without no liability incurred) is superior, being closer to  (given the convexity of ). If  is chosen under *Ordinary Negligence* (with liability incurred), then the result under *Gross Negligence* is again superior, for the same reasons as stated per the comparison with *Strict Liability*.

To compare the result under *Capped Liability*, denote by  the level of care chosen by the BCI if (capped) liability is incurred. As the BCI is assumed to disfavor liability, . Accordingly, the level of care chosen by the BCI under *Capped Liability* is either  or  (as opposed to  or  under *Ordinary Negligence*). Subject to this variation, the reasons underlying the superiority of *Gross Negligence* over *Capped Liability* are essentially the same as those underlying its superiority over *Ordinary Negligence*.

*Case (2)*

Under *Gross Negligence*, the BCI selects  with no liability incurred, and thus its private choice is aligned with the social optimum. Hence, by definition it (weakly) dominates all alternative regimes.[[36]](#footnote-37)

**Lemma 3:** In case (3), *Gross Negligence* weakly dominates *Strict Liability* and *Ordinary Negligence*, but its relation to *No Liability* and *Capped Liability* is ambiguous.

**Proof:**

Under *Gross Negligence* the BCI selects either  (and incurs liability) or  (incurring no liability). If it chooses  then *Gross Negligence* (weakly) dominates all four regimes, by the optimality of .[[37]](#footnote-38) If it selects , the result is socially equivalent to that reached under both *Strict Liability* and *Ordinary Negligence*.[[38]](#footnote-39) However, the relation to *No Liability* and *Capped Liability* is ambiguous. This is proven by considering two examples per each comparison, establishing the possible superiority of either regime.

Under *No Liability*, the BCI selects . As demonstrated by the following two examples, the welfare implication is inconclusive:

Example 1 (superiority of *No Liability*): Suppose that . Hence, the level of care under the two regimes is essentially the same, and so are the losses incurred by consumers. However, only under a *Gross Negligence* regime is liability incurred. Thus, due to the efficiency of production (), welfare is greater under *No Liability*.[[39]](#footnote-40)

Example 2 (superiority of *Gross Negligence*): Suppose that under *Gross Negligence* the selected level of care is nearly optimal, and that given such investment nearly no losses are incurred by consumers. Hence,  and . As under both regimes virtually no liability is incurred,  is superior to, being closer to . Hence, *Gross Negligence* is superior to *No Liability*.

Under *Capped Liability*, the BCI selects  or . The following two examples establish the ambiguity of the comparison.

Example 1 (superiority of *Capped Liability*): Suppose that the cap is set at zero, so that no liability is incurred under *Capped Liability*. Hence, , and therefore  is preferred by the BCI to . Further suppose that is arbitrarily close to . Hence, essentially the same level of care is taken under the two regimes, but only under *Gross Negligence* is liability incurred. Thus, by the efficiency of production, the *Capped Liability* regime is superior.

Example 2 (superiority of *Gross Negligence*): Suppose that under *Gross Negligence* the selected level of care () is nearly optimal, and that given such level of care nearly no losses are incurred by consumers. Hence, and . In contrast, suppose that under *Capped Liability* the selected level of care () approaches zero, and liability for losses exceeds the cost of optimal care, . Thus,  and , (wheredenotes the expected liability incurred under a *Capped Liability* regime). Welfare under *Gross Negligence* therefore approaches , whereas under *Capped Liability* it approaches . As  by assumption, and as , welfare under *Gross Negligence* is greater. 

Proposition 2 follows directly from the three lemmas established above.

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1. \* Interdisciplinary Center (IDC) Herzliya, Radzyner School of Law [↑](#footnote-ref-2)
2. \*\* Tel Aviv University Faculty of Law [↑](#footnote-ref-3)
3. \*\*\* Interdisciplinary Center (IDC) Herzliya, Radzyner School of Law [↑](#footnote-ref-4)
4. As we show, a BCI conforming to the lenient *Gross Negligence* standard is taking the socially optimal level of care, and is therefore not negligent at all. [↑](#footnote-ref-5)
5. For an overview, see Section II. [↑](#footnote-ref-6)
6. See, e.g., Epstein (1999), 619. [↑](#footnote-ref-7)
7. Epstein (1999), 621-624. Regarding claims against the federal government, see the Federal Torts Claim Act (28 U.S.C. §2674). For a discussion of the state level, see Dobbs (2000) 715-18; Restatement (second) of Torts, §895B. [↑](#footnote-ref-8)
8. See Dobbs, Id., 718-720. Bailey v. Mayor of New York, 3 Hill 531, 539 (N.Y. Sup. Ct. 1842). [↑](#footnote-ref-9)
9. Dobbs, Id., 698; Restatement (second) of Torts, §895B, cmt. D and §895C, cmt. g; See also Krent (1992). [↑](#footnote-ref-10)
10. See, e.g., Epstein (1999), 628-30. [↑](#footnote-ref-11)
11. Id., 629. [↑](#footnote-ref-12)
12. Dobbs (2000), 696-701; 716-18. [↑](#footnote-ref-13)
13. Epstein (1999), 628-630; See also Restatement (second) of Torts, §895C cmt. e. [↑](#footnote-ref-14)
14. Dobbs (2000), 703. See also Baum v. United States, 986 F.2d 716 (4th Cir. 1993) (Building a bridge with defective guardrails is considered a discretionary act, since “the question of what materials to use in such a project is… a question of how to allocate limited resources among competing needs. Considered in this light... [the] decision in this regard plainly was one bound up in economic and political policy considerations”.) See also Rich v. United States, 119 F.3d 447 (6th Cir. 1997). [↑](#footnote-ref-15)
15. For cases that found the operation of the pool to be a public activity and therefore immune from liability see: Zacharias v. Minnesota Dep't of Natural Resources, 506 N.W.2d 313 (Minn. Ct. App. 1993); Baltimore v. State, 173 Md. 267 (Md. 1937); Austin v. Balt., 286 Md. 51 (Md. 1979); Nissen v. Redelack, 246 Minn. 83 (Minn. 1955). For cases that categorized the public pool activity as proprietary see: Weeks v. Newark, 62 N.J. Super. 166 (App.Div. 1960); Hack v. Salem, 174 Ohio St. 383 (Ohio 1963). [↑](#footnote-ref-16)
16. Dobbs (2000), 760-765; Epstein (1999), 617-619. [↑](#footnote-ref-17)
17. Dobbs, id; Epstein, id; Restatement (second) of Torts, §895E cmt c(5). [↑](#footnote-ref-18)
18. Epstein, Id., 618. Southern Methodist Hospital and Sanitarium of Tucson v. Wilson, 46 P.2d 118 (Ariz. 1935). [↑](#footnote-ref-19)
19. Epstein, Id., 617. [↑](#footnote-ref-20)
20. Restatement (Second) of Torts §895E.; Dobbs (2000), 763. In some states, however, liability caps are still applied. See infra note 20. [↑](#footnote-ref-21)
21. According to the Restatement “all of the supposed reasons for the immunity fail when the charity can insure against liability” and “ in any case the interest of the public in proper care and treatment, and the compensation of harm done, may well outweigh in social importance the encouragement of donations.” Restatement (Second) of Torts §895E cmt. c. [↑](#footnote-ref-22)
22. Note that as consumer valuations are homogeneous, demand for  is constant. [↑](#footnote-ref-23)
23. In a *Capped Liability* regime the injurer is subject to the ordinary standard of care (), but the magnitude of liability when found negligent is capped by a ceiling. Thus, liability caps limit the scope of liability without applying a differential standard. Such a regime is often employed in the case of BCIs. *See*, e.g., Dobbs (2000:718,764); Restatement, (Second) of Torts sec. 895B, cmt. f. *See also* Tremper (1991) (proposing that a “Charitable Redress System” be formed, under which charitable institutions would bear liability for some losses but not for all.) [↑](#footnote-ref-24)
24. Differentiating (3) according to  yields the first order condition, which is always negative. Thus,  is maximized when . [↑](#footnote-ref-25)
25. A discrete version of the same analysis demonstrates that an added precaution costing , which decreases expected loss by , should be taken if and only if

 

where $l\_{0}$ and $c\_{0}$ are the expected loss and the costs of care and production, respectively, if the specific precaution is not taken. For example, suppose that the cost of production is  if care is low and  if care is high; expected harm is  and , respectively; and the individual value from the service is . For a private injurer it is clearly optimal to take the higher level of care, as the sum of costs of care and losses are thereby minimized and equal . If, however, services are provided by a BCI, and its budget constraint is binding, then social welfare is higher under the lower level of care, since . [↑](#footnote-ref-26)
26. Under *Strict Liability* , and thus social welfare is given by . The socially optimal level of care is then given by . The maximal level of welfare is lower than under *Gross Negligence*, since:

 .

The first inequality follows from the efficiency of production (see (1)) while the second from the optimality of  (see (4) and (5)). [↑](#footnote-ref-27)
27. To illustrate, suppose that a marginal dollar would generate a value of $1 if invested in care, but $5 if used in production. Thus, it would be socially desirable that it be used in production. But if it is so used, then under *Strict Liability* the cost of liability would rise by $1. As there would then be $1 less with which to produce, the marginal benefit from production would fall by $5. Thus, channeling the dollar to production would be futile; it would enhance utility by $5, but also cause it to fall by the same amount (as a result of liability.) As long as the marginal dollar generates a value of at least a dollar in care, it cannot be beneficially used in production, regardless of its marginal value in production. [↑](#footnote-ref-28)
28. Formally, *Gross Negligence* dominates *Ordinary negligence* as due to the optimality of  (see (4) and (5)). Under *Capped Liability* the BCI may select either (in which case it bears no liability) or a level below (in which case liability is imposed). If the former is selected then the superiority of *Gross Negligence* is established by the same reasoning as above. If the latter is selected, then social welfare under *Capped Liability* is given by . In that case as well, social welfare under *Gross Negligence* exceeds that under *Capped Liability*. Denoting by  the level of care maximizing social welfare under *Capped Liability,* observe that . The first inequality follows from the optimality of  (see (4) and (5)), whereas the second from the efficiency of production (see (1)). [↑](#footnote-ref-29)
29. This condition guarantees that the budget is binding at the optimum. If the budget is not binding at the optimum then remaining budget dollars should be channeled to increased care. As the budget approaches , the level of care approaches . If additional funds remain after that, then the BCI should simply distribute them to consumers in cash.

 [↑](#footnote-ref-30)
30. To formally establish that  differentiate (10) with respect to *c*: . Evaluating this derivative at  and substituting from (5) , we get , where the inequality follows since and . As the derivative equals zero at  and is negative at , it must be that . [↑](#footnote-ref-31)
31. It is worth noting that efficient sorting could be further enhanced if the BCI charged participation fees. By reducing the overall utility from consumption, such fees would also drive out those whose valuations are the lowest. Furthermore, the available budget would increase, which would allow more consumers to be served. [↑](#footnote-ref-32)
32. For a discussion of what charities maximize, see Tremper (1991), Young (1983). For a discussion of sovereign immunity in light of different possible motivational theories of government, see Spitzer (1977) and Gillette & Stephan (2000). [↑](#footnote-ref-33)
33. To demonstrate this point analytically, consider a consumer positioned behind a veil of ignorance, before knowing whether she would be selected as one of the recipients of the service. Her expected utility is then given by:



where is the utility from consumption of a unit, and is the probability of obtaining the service. The probability, in turn, can be rewritten as the overall number of units produced, , divided by the number of units demanded,:



Substituting forand maximizing over , we obtain the condition for utility maximization:



which is precisely the condition that also defines the social optimum under a *Gross Negligence* regime (see (5)). [↑](#footnote-ref-34)
34. Indeed, doing so would be inefficient. If a marginal tax dollar creates a deadweight loss of , then levying it as a tax is efficient only if its value in the state's operation exceeds . Thus, it is inefficient for the state's budget to reach the point in which it ceases to be binding, i.e., the point for which the marginal budget dollar yields a value of merely a dollar to consumers. Accordingly, when taxes are levied efficiently, the state's investment in both production and care should remain lower than that of private producers. [↑](#footnote-ref-35)
35. If , under  no liability is incurred, social welfare is given by . If liability is incurred, then it is given by . The former exceeds the latter, if and only if , which is the condition for the efficiency of production. [↑](#footnote-ref-36)
36. Note that the result under alternative regimes will generally be strictly inferior. Under *No Liability* the BCI would choose; under *Strict Liability*, it would choose; under *Ordinary Negligence* it would choose  (with liability), or (without liability); and under *Capped Liability* it would choose (with liability) or  (without it). In all of these cases, the level of care will generally be inadequate or excessive, and in some cases inefficiency will be further exacerbated as a result of liability. [↑](#footnote-ref-37)
37. Note that the four regimes produce the same set of potential results in cases (2) and (3). Thus, in case (3) as well as in case (2), the superiority of *Gross Negligence* will generally be strict. [↑](#footnote-ref-38)
38. Recall that , and hence case (3) can be written (more completely) as . Thus, if under *Gross Negligence* the BCI prefers to  despite the liability implications, then under ordinary negligence the preference for should only be reinforced. [↑](#footnote-ref-39)
39. Welfare under *No Liability* is given by , whereas under *Gross Negligence* it is . As can be easily verified, the former exceeds the latter given that production is efficient. [↑](#footnote-ref-40)