

**EC337 – Economic Analysis of Legal Issues
Spring 2013, Boston University**

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Third Mid-term Practice Test – Solutions

Thursday, April 11, 2013

This is a 38-minute test. There is a total of 38 points allocated across two questions. Use the number of points allocated to each part as a suggestion for how long to spend on that part. I recommend that you attempt all parts before using more time than is suggested for any one part. If you complete some parts in less than the suggested time, use your extra time to revisit parts you may have had trouble with the first time through and to check your work.

Please read the questions carefully and write your answers in the blue booklets provided. Please follow my instructions at all times.

You only need to identify yourself with your BU ID on the blue booklets. You may keep this question sheet when the exam is over.

1. [24 points total, 5 parts] Suppose that drinks manufacturers use glass bottles to package their products. Occasionally, glass bottles become damaged during shipping, in which case tiny glass shards can become mixed with the drink. If a purchaser consumes a drink from such a damaged container, she will sustain an injury from the glass shards. Assume that 10% of drink bottles contain glass shards, so that, if neither party takes care, there is a 10% probability that a purchaser will be injured. The true damage suffered from such an injury would be \$8000. Purchasers/Plaintiffs (P) can reduce the probability of an injury occurring to zero if they always pour their drinks through a filter before consuming them, at a cost of \$200 (in time and effort). Drinks manufacturers/Defendants (D) can reduce the probability of an injury occurring to zero if they use stronger bottles, at a cost of \$600 (in increased production costs). All parties know this information with certainty.

a) [3 points] What is the efficient level of prevention, and what is the associated outcome? Explain briefly.

answer:

social loss if neither invests = $0.1 \times 8000 = 800$

social loss if only D invests = 600

social loss if only P invests = 200

The efficient level of prevention is therefore for only P to take care, since this minimizes the total social loss. The associated outcome is for there to be no injuries.

b) [5 points] Will efficiency be achieved if everyone knows that courts always apply the original Hand Rule when determining which party is at fault? Explain.

answer:

Under the original Hand Rule, D must pay full damages if D's burden of prevention is less than the expected harm. In this case, $600 < 800$, so D will be found negligent and ordered to pay 8000 if there is an injury.

P's private loss if she invests in prevention is 200. P's private net loss if she doesn't invest in prevention is 0. So P will not invest, since this minimizes her private loss. [Her net loss will be zero because either D will invest and there will be no injury, or D will not invest but will have to fully compensate P for any injury. You don't have to write this explanation for full credit, but you need to understand it to be able to get the right answer in the first place.]

D's private loss if he invests in prevention is 600. D's private expected loss if he doesn't invest is 800. So D will invest, since this minimizes his private loss. [D realizes that P will not invest as per the discussion above, so knows that an injury will happen with 10% probability if he also doesn't invest. And he knows that he will have to pay 8000 when an injury does happen, for an

expected loss of $0.1 \times 8000 = 800$. Again, you don't have to write these details for full credit, but you do need to understand them.]

Therefore, D will choose to invest and P will not. So, no, efficiency will not be achieved. [It's not efficient because it doesn't match what we identified as efficient in part a). The qualitative outcome is the same – i.e. no injuries – but this is achieved at too high a cost. And transaction costs would be far too high for all Drinks manufacturers to be able to bargain with all Purchasers to get them to invest instead. Again, you don't need to write this part.]

c) [5 points] Will efficiency be achieved if everyone knows that courts always apply the contributory negligence standard when determining which party is at fault? Explain.

answer:

Under contributory negligence, P will receive zero compensation if D's burden of prevention is less than expected harm and P's burden of prevention is also less than expected harm. In this case, $600 < 800$ and $200 < 800$, so P will receive zero compensation if there is an injury.

D's private loss if he invests in prevention is 600. D's expected private loss if he doesn't invest in prevention is 0. So D will not invest, because this minimizes his private loss. [D's expected private loss is zero because either P will invest and there will hence never be an injury, or P will not invest but will be entitled to zero compensation whenever there is an injury.]

P's private loss if she invests in prevention is 200. P's expected private loss if she doesn't invest in prevention is 800. So P will invest, since this minimizes her private loss. [P realizes that D will not invest as per the discussion above, so knows that an injury will happen with 10% probability if she also doesn't invest. And she knows that she will have to suffer the 8000 in harm when an injury does happen, for an expected loss of $0.1 \times 8000 = 800$.]

Therefore, P will choose to invest and D will not. So, yes, efficiency will be achieved. [This exactly matches what we identified as efficient in part a).]

d) [5 points] Will efficiency be achieved if everyone knows that courts always apply the pure comparative negligence standard when determining which party is at fault? Explain.

answer:

Under the pure comparative negligence standard, if both D and P have a burden of prevention less than expected harm, D will have to pay the fraction $\left(1 - \frac{B_D}{B_D + B_P}\right)$ of damages. In this case, $600 < 800$ and $200 < 800$, so D will have to pay $(1 - 600/800) \times 8000 = 8000/4 = 2000$ to P if there is an injury.

D's private loss if he invests in prevention is 600. D's maximum expected private loss if he doesn't invest is 200. So D will not invest, since this minimizes his private loss. [His private loss from not investing would be zero if P invested, which would only strengthen his decision

not to invest. But in the worst case scenario, if P also did not invest, injuries would happen with 10% probability, and D would have to pay his quarter of the 8000 in harm, for an expected loss of $0.1 \times 8000/4 = 200$.]

P's private loss if she invests in prevention is 200. P's expected private loss if she doesn't invest in prevention is 600. So P will invest, because this minimizes her private loss. [If D were to invest, her private loss from not investing would be zero, since there would never be an injury, and she would thus prefer not to invest. But P realizes that D will not invest as per the discussion above, so knows that an injury will happen with 10% probability if she also doesn't invest. And she knows that she will have to suffer her three quarters of the 8000 in harm on net after receiving compensation from D when an injury does happen, for an expected loss of $0.1 \times (8000 - 2000) = 600$.]

Therefore, P will choose to invest and D will not. So, yes, efficiency will be achieved.

e) [6 points] Suppose that all drinks manufacturers believe that courts always apply the contributory negligence standard when determining fault, while all purchasers believe that courts always apply the original Hand Rule for this purpose. Will efficiency be achieved in the short run? In the long run? Explain.

answer:

Drinks manufacturers: as per the answer to part c), D will choose to not invest.

Purchasers: as per the answer to part b), P will choose to not invest.

Therefore, neither will invest in prevention. So, no, efficiency will not be achieved in the short run.

However, with neither investing, injuries will happen with 10% probability. When an injury does occur, P will sue because, believing that the original Hand Rule will be applied, will think that she will receive compensation. So, in the long run, both parties will learn, from direct experience, what negligence standard courts *actually* apply, and will change their beliefs and, if necessary, their behavior, accordingly. Whether efficiency is achieved in the long run will then depend on which standard courts *actually* apply – as per the answers to the previous parts: if pure comparative negligence or contributory negligence, yes; but if the original Hand Rule, no.

2. [14 points total, 3 parts] Consider a hypothetical accident involving a driver and a pedestrian. If neither party takes care, the probability of an accident occurring at any given location at any given time is 10%. In the event that an accident occurs, the pedestrian/plaintiff (P) will suffer true damages in the amount of \$1000, while the driver/defendant (D) will suffer no damages. Suppose that, to independently reduce the probability of an accident to zero, drivers would have to install a sensor on their cars at a cost of \$80 each. Also suppose that, to independently reduce the probability of an accident to zero, pedestrians would have to buy special running shoes at a cost of \$120 each. Assume for now that all parties know this information with certainty.

a) [3 points] What is the efficient level of prevention, and what is the associated outcome? Explain briefly.

answer:

social loss if neither invests = $0.1 \times 1000 = 100$

social loss if only D invests = 80

social loss if only P invests = 120

The efficient level of prevention is therefore for only D to take care, since this minimizes the total social loss. The associated outcome is for there to be no accidents.

b) [5 points] Will efficiency be achieved if everyone knows that courts always apply the contributory negligence standard when determining which party is at fault? Explain.

answer:

Under contributory negligence, P will receive zero compensation if D's burden of prevention is less than expected harm and P's burden of prevention is also less than expected harm. In this case, $80 < 100$ but $120 > 100$, so only D will be found negligent, and P will receive full compensation if there is an accident. [We didn't cover this very explicitly in the classroom, so take your time to digest it here. Under contributory negligence and pure comparative negligence, if only one party has a burden of prevention less than the expected harm, that party will be found fully liable and ordered to bear full responsibility for the harm.]

P's private loss if she invests in prevention is 120. P's expected private loss if she doesn't invest in prevention is 0. So P will not invest, since this minimizes her private loss. [Her expected private loss is zero because she knows that she will never be found negligent, so will be fully compensated if there ever is an accident.]

D's private loss if he invests in prevention is 80. D's expected private loss if he doesn't invest in prevention is 100. So D will invest, because this minimizes his private loss. [D realizes that P will not invest as per the discussion above, so knows that an injury will happen with 10% probability if he also doesn't invest. And he knows that he will have to pay 1000 when an injury does happen, for an expected loss of $0.1 \times 1000 = 100$.]

Therefore, D will choose to invest and P will not. So, yes, efficiency will be achieved.

c) [6 points] Now suppose that pedestrians have imperfect information about the probability of an accident occurring. Specifically, pedestrians believe that the probability of accidents is 15%. Drivers and courts know with certainty that the true probability is 10%, and are not aware that pedestrians believe otherwise. Now will efficiency be achieved if everyone knows that courts always apply the contributory negligence standard? Explain.

answer:

Just as in part b), the court will see that $B_D < Pr \times L$ but that $B_P > Pr \times L$, so will find D negligent if there is an accident and the case goes to trial; and D, knowing this, will choose to invest in prevention by the argument in the answer to part b). [D knows that his private loss from investing in prevention is 80, and he *thinks* that his expected private loss from not investing in prevention is 100 (because he doesn't think that P will invest, so that if he also doesn't invest, he'll have to pay 1000 in damages with 10% probability). It's going to turn out that P will also invest in prevention as argued below, and if D could foresee this, he would know that his expected private loss from investing is actually zero, since there will never be an accident due to P's investment. But he has no reason to expect that P will behave/think any differently than she did in part b).]

However, P thinks that she will also be found to be negligent, because she *thinks* that expected harm is $Pr' \times L = 0.15 \times 1000 = 150$ (where Pr' refers to her belief of a 15% injury probability), while she knows that her burden of preventing injuries is $B_P = 120$. So, she *believes* that, by the contributory negligence standard, D will be found negligent (because $80 < 150$ – again, according to her beliefs), but she will also be found negligent (because $120 < 150$), so she will receive zero compensation. And since she expects to receive zero compensation from D, she has no reason to expect that D will be motivated to invest in prevention. So P weighs her private loss from investing in prevention (120) against her perceived private expected loss from not investing (150, in terms of the expected harm she perceives that she would face as a result of not investing). She will hence choose to invest, since this minimizes her perceived private loss.

Therefore, both D and P will choose to invest. So, no, efficiency will not be achieved.

[Accidents are prevented, which is great in itself, but this is accomplished at a huge and partially redundant cost. Because of this mistaken belief on the part of pedestrians – which could alternatively be interpreted as pedestrians purposely being overly cautious – the worst possible outcome is obtained in this case, with a social loss of 200. Even more depressing than this is that there is no mechanism by which pedestrians might learn from their mistake and eventually change their beliefs: since there is investment in prevention, there will never be accidents, so there will never be court cases, and therefore no opportunities for purchasers to see their beliefs proven wrong. It also seems reasonable to assume that transaction costs are too high for pedestrians to try to bargain with drivers to install sensors, and that pedestrians can't tell if drivers have taken care – i.e. if cars have sensors – just by looking; though if either of these assumptions does not hold, we'd expect pedestrians to realize their mistake eventually.]