

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

Instructor: Jeremy Smith

**First Mid-term Test – Solutions**

Wednesday, February 20, 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. [25 points total, 7 parts] A train company currently operates a single train on a route that passes through a farmer's crop land. The train company earns \$800 profit per year. The farmer grows \$500 worth of crops per year, but \$200 worth of these crops is destroyed per year due to sparks from the train. The train company could install a spark suppressor at a cost of \$300 per year that would eliminate all crop damage from sparks. The farmer could choose to plant an alternative crop that would not be damaged by sparks, but would only be able to grow \$400 worth of this alternative crop per year.

a) [2 points] Which party is causing the externality? Explain.

answer:

Both. If there were no train company, there would be no sparks doing damage to the crops; but if there were no crops, there would be nothing for the sparks to do damage to.

b) [3 points] What is the efficient outcome? Why?

answer:

Social surplus in the status quo:  $800 + 500 - 200 = \$1100$ .

If spark suppressor installed:  $800 + 500 - 300 = \$1000$ .

If alternative crop planted:  $800 + 400 = \$1200$ .

The efficient outcome is therefore for the alternative crop to be planted, since this maximizes the social surplus.

Suppose that the farmer sues the train company. Assume for now that there are no transaction costs whatsoever.

c) [4 points] Will efficiency be achieved if the court issues an injunction against the train company? Explain.

answer:

Train company's private profit if it stops running the train: \$0.

If it installs the suppressor:  $800 - 300 = \$500$ .

If it bargains with the farmer to accept money compensation:  $800 - 200 - \text{whatever bribe is agreed to} = \$600 - \text{bribe}$ .

If it bargains with the farmer to plant the alternative crop:  $800 \text{ minus whatever bribe is agreed to} = \$800 - \text{bribe}$ .

The train company's best option would be to bargain with the farmer to plant the alternative crop as long as the associated bribe is less than \$200. The farmer would need a bribe of at least \$100 [to bring private profit to at least \$500, which it would be if the injunction were literally enforced]. Since there are no transaction costs, an agreement will be reached.

The train company will therefore bargain to have the alternative crop planted, since this would maximize its profit. Thus, the efficient outcome will be achieved.

d) [4 points] Will efficiency be achieved if, instead, the court asserts the right of the train company to be free of all liability for damage caused by its sparks? Explain.

answer:

Farmer's private profit if he does nothing:  $500 - 200 = \$300$ .

If he bargains to have the suppressor installed:  $500 - 300 - \text{bribe} = \$200 - \text{bribe}$ .

If he plants the alternative crop: \$400.

The farmer will therefore choose to plant the alternative crop, since this will maximize his profit. Thus, the efficient outcome will be achieved.

Now assume that a transaction cost exists of the following specific form: the train company needs to pay its lawyers a fee of \$250 to witness any payment to an outside party.

e) [4 points] Now will efficiency be achieved if the court issues an injunction against the train company? Explain.

answer:

Train company's private profit if it stops running the train: \$0.

If it installs the suppressor:  $800 - 300 = \$500$ .

If it bargains with the farmer to accept money compensation:  $800 - 200 - 250$  minus whatever bribe is agreed to =  $\$350 - \text{bribe}$ .

If it bargains with the farmer to plant the alternative crop:  $800 - 250$  minus whatever bribe is agreed to =  $\$550 - \text{bribe}$ .

The train company's best option would be to bargain with the farmer to plant the alternative crop as long as the associated bribe is less than \$50. But the farmer would need a bribe of at least \$100. There is hence no possibility for a bargain to be reached.

The train company will therefore install the spark suppressor, since this would maximize its profit. Thus, the efficient outcome will *not* be achieved.

[As in the example in the practice test, these calculations assume that the train company can leverage its own avoidance measure – here, the suppressor – without paying an additional bribe and therefore not paying any associated transaction cost; but must pay an additional bribe (and thus any associated transaction cost) if it just wants to pay money compensation for the damage. The reasoning is that, in the first case, the sparks are actually stopped, so that the farmer would have no basis for taking the train company back to court to have the injunction literally enforced. But in the second case, the train company cannot just make a take-it-or-leave-it offer to pay just for the damages without getting consent from the farmer and an agreement not to sue again – which might require an additional bribe to the farmer.]

f) [4 points] Now will efficiency be achieved if the court orders the train company to compensate the farmer for all damage done by its sparks, and absorbs any transaction costs associated with this compensation payment? Explain.

answer:

Train company's private profit if it stops running the train: \$0.

If it installs the suppressor:  $800 - 300 = \$500$ .

If it pays money compensation:  $800 - 200 = \$600$ .

If it bargains with the farmer to plant the alternative crop:  $800 - 250$  minus whatever bribe is agreed to =  $\$550 - \text{bribe}$ .

The train company will therefore choose to keep emitting sparks and pay money compensation for the damage they cause, since this would maximize its profit. Thus, the efficient outcome will *not* be achieved.

[Something like this came up when discussing Example 3 in class: when the court assigns property rights to the plaintiff in the form of money damages, we can assume that it manages the transfer of this payment from one party to the other, and thus that the parties do not have to bear any transaction cost. In the story of the present problem, the idea is that the train company does not have to pay a lawyer to witness the payment since the court is there to witness the payment it has ordered itself. This part and the previous part together are related to the discussion of injunctions versus money damages when it is efficient to let the damage stand, in which it was argued that, if courts calculate and manage the transfer of money damages, property rights can be assigned to the injured party in this form without the concern arising that transaction costs might lead to an inefficient outcome. But in this example, it is not efficient to let the damage stand. Money damages lead to an outcome with a higher social surplus than the outcome that an injunction leads to in this case, but they do not lead to the efficient outcome.]

[Some people interpreted the question to mean that the train company would have to pay the transaction cost along with money damages. While I will admit that the question is long and not asked as straightforwardly as it might have been, the grammar is correct and conveys that it is

“the court” that both “orders” and “absorbs”. I understand that such subtleties are difficult to pick up when time is at a premium. I will try my best not to have such cumbersome sentences on future tests and exams. In the meantime, I have tried to penalize mistakes stemming from this as lightly as possible.]

g) [4 points] Now will efficiency be achieved if, instead, the court asserts the right of the train company to be free of all liability for damage caused by its sparks? Explain.

answer:

The transaction cost does not affect anything in the response to part d). Efficiency will be achieved.

2. [13 points total, 4 parts] Consider a dairy farmer and a grain farmer with adjoining properties. The dairy farmer has a single cow and earns \$100 per year from selling the milk. The grain farmer grows \$200 worth of crops per year, but the dairy farmer’s cow does \$130 of damage per year to the grain farmer’s crops. Either farmer could build and maintain a fence between the properties that would prevent the cow from doing any crop damage for \$110 per year.

a) [2 points] What is the efficient outcome? Why?

answer:

Social surplus in the status quo:  $100 + 200 - 130 = \$170$ .

If the fence is built:  $100 + 200 - 110 = \$190$ .

If the dairy farmer leaves: \$200.

The efficient outcome is for the dairy farmer to leave, since this maximizes the social surplus.

Suppose that the grain farmer sues the dairy farmer. Assume that there are no transaction costs.

b) [4 points] Will efficiency be achieved if the court asserts the right of the dairy farmer to let his cow roam without any liability? Explain.

answer:

Private profit of the grain farmer if she does nothing:  $200 - 130 = \$70$ .

If she builds the fence:  $200 - 110 = \$90$ .

If she bargains with the dairy farmer to leave: \$200 – bribe.

The grain farmer's best choice would be to bargain with the dairy farmer to go away as long as the required bribe is less than \$110. The dairy farmer would need a bribe of at least \$100. Since there are no transaction costs, an agreement will be reached.

The grain farmer will therefore choose to bargain with the dairy farmer to leave, since this maximizes the grain farmer's profit. Thus, the efficient outcome will be achieved.

c) [4 points] Will efficiency be achieved if, instead, the court finds the dairy farmer liable and orders him to fully compensate for all damage his cow does to the grain farmer? Explain.

answer:

Dairy farmer's profit if he does nothing:  $100 - 130 = -\$30$ .

If he builds the fence:  $100 - 110 = -\$10$ .

If he leaves: \$0.

The dairy farmer will therefore choose to leave, since this maximizes his profit [or, equivalently, minimizes his loss]. Thus, the efficient outcome will be achieved.

d) [3 points] Instead of courts wasting their time and resources hearing property disputes between dairy farmers and grain farmers, the government could just pass a regulation that makes it illegal for any dairy farms to exist. Does the present example prove that such a regulation would be efficient? Discuss.

answer:

If all disputes between dairy farmers and grain farmers were like this one, it does indeed seem like outlawing dairy farmers would be the best solution. If instead these disputes were left to courts to decide: if there were no transaction costs, dairy farmers would end up leaving in any case; and if there were transaction costs, they might interfere with dairy farmers leaving depending on how courts determine property rights, which would be inefficient. So the regulation would remove the probability of courts assigning property rights in a way that would lead to inefficiency, and would do away with court operational costs altogether. Of course, not all disputes between farmers will be like this one. Sometimes the dairy farmer might have a cheaper avoidance option than leaving, and other times the dairy farmer might not be the least-cost avoider at all. In these alternative scenarios, the regulation would be inefficient. The only way to ensure that the efficient outcome is reached in every case would be to have a court operate on a case-by-case basis and assign property rights to the higher-cost avoider.