

Section Exercise for February 24/25: Externalities DRAFT

The reference here is to the debate between Arthur Cecil Pigou's *Economics of Welfare* and Ronald Coase's "The Problem of Social Cost".

We have a railroad line, down which ten trains can be run each day. On any given day, either all trains must be "local" trains or all trains must be "express" trains.

The first local train of the day produces \$100,000 of value, the second \$90,000, the third \$80,000, and so on down until the tenth local train produces \$10,000 of value. Moreover, these trains impose *external costs*. While the first train does no damage to surrounding fields via sparks from the locomotive, the second train a day does \$5,000 of damage, the third train \$10,000 of damage, and so forth.

The first express train of the day produces \$99,000 of value—the extra speed breaks some of the cargo. The second express produces \$89,000 of value, the third express \$79,000 of value, and so on down. And these express train do twice as much damage to surrounding fields. The first express train does no damage, but the second does \$10,000, the third \$20,000, and so on down.

1) What is the best number of local trains for a benevolent utilitarian planner to run down this track each day? How much in economic value do these trains create? Is there any reason to ever run express trains?

Arthur Cecil Pigou says: The first seven trains together produce \$490,000/day of value, but they have external costs—they impose externalities on the local farmers. The externalities amount to \$105,000/day. So only \$385,000/day of economic value is created. And it is inefficient to run a eighth train: the \$30,000 of value it would produce is not worth the \$35,000 of externality damage it does.

2) Arthur Cecil Pigou says: The market system would run the wrong number of trains down the tracks. How many trains would the market system run down the tracks? What would be the economic value created?

The railroad company would run all ten local trains, and so create \$550,000 of value for itself—but it would impose \$225,000 of externality costs on others. The market would thus produce only \$325,000 of value, \$60,000 less than the optimum.

3) Arthur Cecil Pigou asks: what tax should we impose on trains in order to make things come out right?

A tax of \$30,000/train would make it unprofitable for the railroad to run trains 8-10. We would then have the railroad running local trains 1-7. It would—after paying taxes—earn \$280,000, impose \$105,000 in costs on farmers, and pay \$210,000 in revenue to the government. The government could then compensate the farmers for their losses, and have \$105,000 left over to use for other purposes.

4) Ronald Coase says: You're wrong, Pigou! We don't need big government and big taxes and big regulation. All you need is a functioning system of tort law. Damaging someone's fields as a result of your activity is a tort! The farmers can sue the railroad. In order to settle the lawsuit, what will a rational railroad decide to do? How many trains will it decide to run, and how much will it be willing to pay the farmers to settle the lawsuit?

The railroad will pay \$105,000 to settle lawsuits for damages from trains 1-7. And it won't run trains 8-10--The money they would earn would not be worth the liability running the trains would expose them to.

5) Then Arthur Cecil Pigou says: that assumes that judges are all wise and always rule the right way. Suppose legal doctrine says fires from smokestacks from train boilers are just things that happen--that railroads have no responsibility to prevent or minimize them, but that this is just one of the hazards of having a farm near where people decide to build a railroad? And Ronald Coase answers: it does not matter as long as we have a functioning legal system of contract law. The farmers can make a contract with the railroad not to run damaging trains. What contract to the farmers then make with the railroad ?

The farmers say: we will pay you \$60,000 and in return you will not run trains 8-10. That way of resolving the situation also reaches the efficient outcome--albeit with somewhat poorer farmers.

6) But then Arthur Cecil Pigou says: It does too matter: what does the farmers have to pay in order to get the railroad to stop running so many trains if the railroad starts running express trains? What happens then?

Express trains 1-5 make \$395K for the railroad and impose \$100,000 of damage on farms. And the farmers then pay the railroad \$350,000 not to run express trains 6-10. The social balance sheet is, then: \$295K of value produced, and \$300K extorted from farmers by legal process.

7) How do you assess the different scenarios set forth in this exercise?

(i) The societal optimum for the railroad would be a net plus for society of \$385,000/day. But there is in the mix also a \$105,000 transfer from the farmers (who pay the cost of the pollution externality) to the railroad (which does not pay) that needs to be dealt with somehow if the coming of the railroad is to be win-win.

(ii) The market system produces \$325,000/day of value—plus a \$225,000 externality-driven transfer from farmers to the railroad.

(iii) A tax of \$30,000/train creates the \$385,000/day optimum societal benefit. But instead of getting that plus a \$105,000/day transfer, the railroad receives only \$280,000/day in benefit, the government receives \$105,000/day in resources it can distribute, and the government receives another \$105,000/day that it can, if it wishes, use to keep the farmers from losing as a result of the establishment of the railroad.

(iv) If tort law gives farmers the right to sue the railroad, then the legal system can also get to the societal optimum—with \$385,000/day flowing to the railroad, and the farmers held harmless.

(v) If tort law gives the railroad the right to run trains, then a working contract law system might get to the societal optimum of a \$385,000/day societal gain—flowing to the railroad—but the contract-law system will accompany it with a \$165,000/day transfer from farmers to the railroad.

(vi) More likely, however, is that the contract law system will induce the railroad to start running express trains—in which case the societal gain (flowing to the railroad) is only \$295,000/day. And it will be accompanied by a \$450,000 dollar pollution-externality-plus-legal-process-extortion transfer

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from farmers to the railroad. The naïve Coasian view happens, in my view, to ignore a huge amount of very interesting and important issues...