

## Coasean Bargaining: A Brief Overview

### January 24, 1999

The conflict between the Northern Central Valley rice and cotton growers, which you read about for today's class, is a classic externality problem. As a reminder, an *externality* is a cost or benefit generated by an economic activity which is borne by someone other than the generator. In this particular case the spraying of herbicides by the rice growers resulted in a cost to the cotton growers because drift from the herbicide damaged cotton crops. Initially, this cost was borne by the cotton growers.

You probably noticed that several strategies were being tried to resolve this conflict. Aerial spray restrictions and mandatory buffer zones were in place, and a lawsuit had been filed. You may have also noticed a solution proposed by one grower: "The solution to this problem is the farmers get together and talk this thing out without shaking fists at each other".

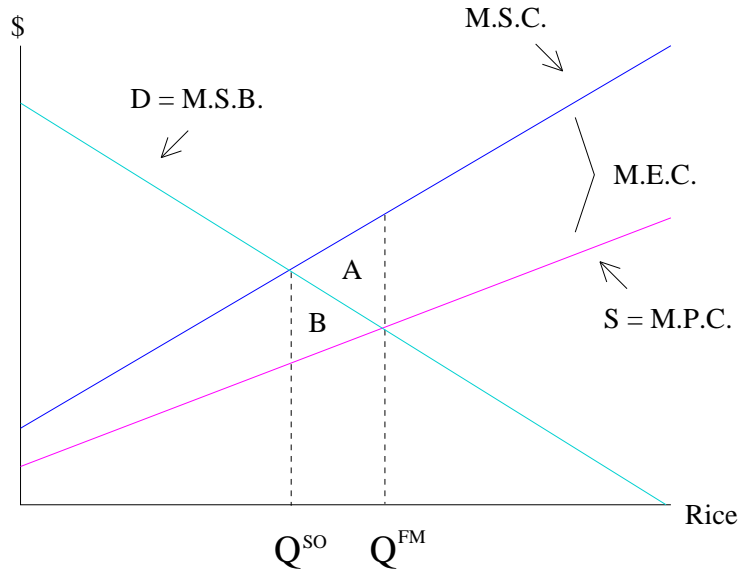
In other words, this grower thinks that negotiation between the cotton and rice growers could lead to an acceptable solution. The goal for today is to answer two questions related negotiation under externalities:

1. What does economic theory tell us about the potential for negotiation to resolve this conflict? Would we expect a negotiated solution to be the best possible one from an economic viewpoint?
2. What factors in this particular case might stand in the way of reaching an appropriate negotiated solution?

**Externalities Reviewed** First, a brief review of what economic theory has to say about free market outcomes under externalities. Let's tell a very simple story based on the three most important economic elements in this case.

1. *Marginal Social Benefits:* In spite of the costs imposed by rice growers on cotton growers, it is worth growing rice. The social benefits of rice are reflected by the fact that consumers are willing to pay something for rice, although the more rice they consume, the less they are willing to pay. In short, the marginal social benefits are represented by a downward-sloping *demand curve* for rice.
2. *Marginal Private Benefits:* The rice growers make profits from the sale of rice to consumers. They are willing to supply rice to the market as long as their costs are met, and as they produce more rice, their costs of production increase. Their private benefits from the sale of rice are represented by an upward-sloping *supply curve* for rice.
3. *Marginal External Costs:* The more land is used for rice production, the greater the drift of rice herbicides to cotton fields. Further, as cotton becomes more scarce in the marketplace, its value will increase. Thus, the costs to cotton growers are represented by an increasing *marginal damage function*.

A graph illustrates these three important elements:

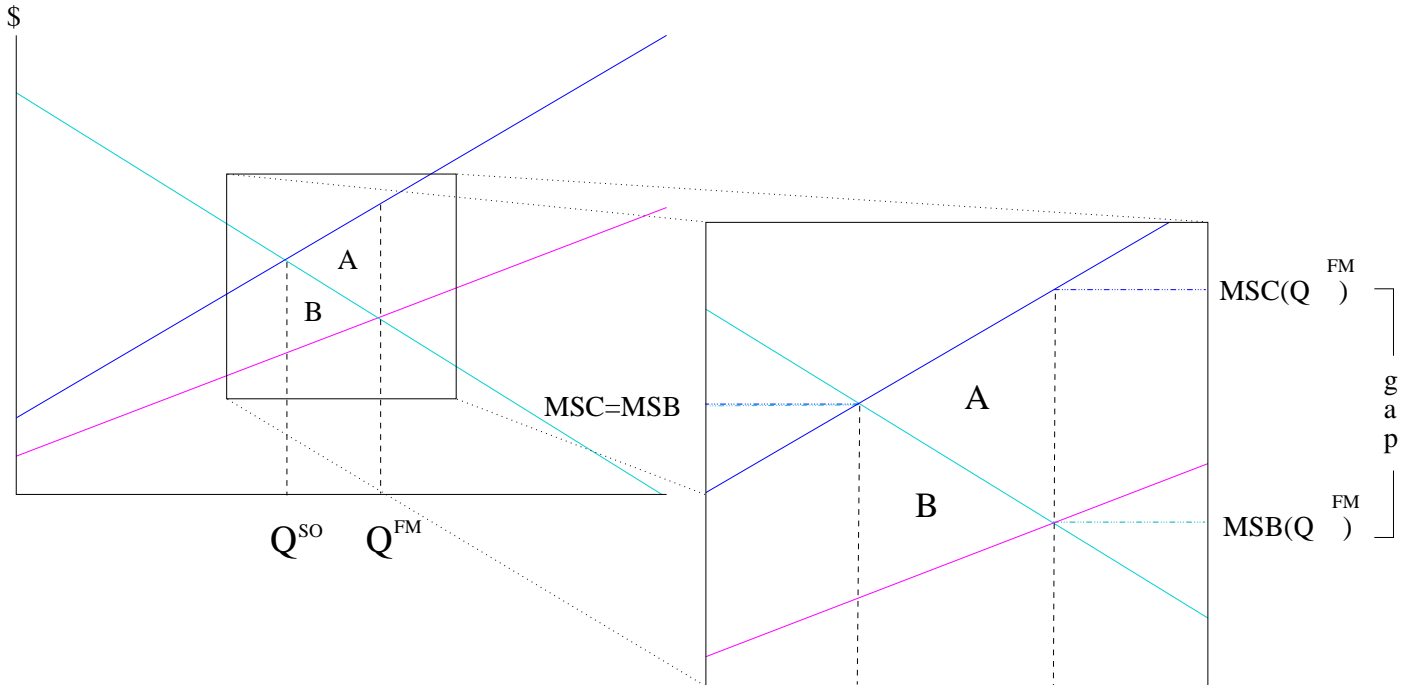


Note that total social costs include both private costs and external costs:

$$M.S.C = M.P.C. + M.E.C. \quad (1)$$

In this case, the total social costs include both the rice grower's costs of production and costs of damage to cotton growers.

Without any policy interventions or negotiation, the quantity  $Q^{FM}$  of rice would be produced. However, this level of production is not the best outcome from a social standpoint. The intuition is that the benefits that society gets from that last unit of rice produced are lower than the costs, when all costs are accounted for. Remember, the social benefits of that last unit are reflected by the height of the demand curve at that point. Notice, if we zoom in on that part of the graph, that there is a substantial gap between the social benefits and the total social costs at the free-market outcome:



The socially optimal outcome is to have a lower level of rice production. Specifically, the social value of the last unit of rice should be just equal to the total social costs of production. Notice that there are social gains from moving from production at point  $Q^{FM}$  to point  $Q^{SO}$ . By reducing rice production, total costs equal to areas  $A + B$  are avoided. However, rice producers also lose potential profits equal to area  $B$ . This area represents the excess of market price over costs, or producer profit, for that additional rice production. The net increase in social welfare is simply:

$$\text{Net Gain} = \underbrace{A + B}_{\text{Avoided ext. costs}} - \underbrace{B}_{\text{Lost profits}} = A \quad (2)$$

**Coasean Bargaining** In theory, negotiation between the rice grower (the *externality generator*) and the cotton grower (the *externality recipient*) can lead to the socially optimal level of output of rice. This result was demonstrated by Ronald Coase<sup>1</sup> and is referred to as the *Coase Theorem*. It is important to note that some very specific conditions need to hold for this theorem to operate:

1. **Property rights must be assigned** This means one of two things: either the rice growers must have the right to pollute, or the cotton growers must have the right to have their property free of drift.
2. **Transaction costs must be absent** This means that there must be no costs to negotiation.

<sup>1</sup>See "The Problem of Social Cost", *Journal of Law and Economics* III (October, 1960), pp. 1-44.

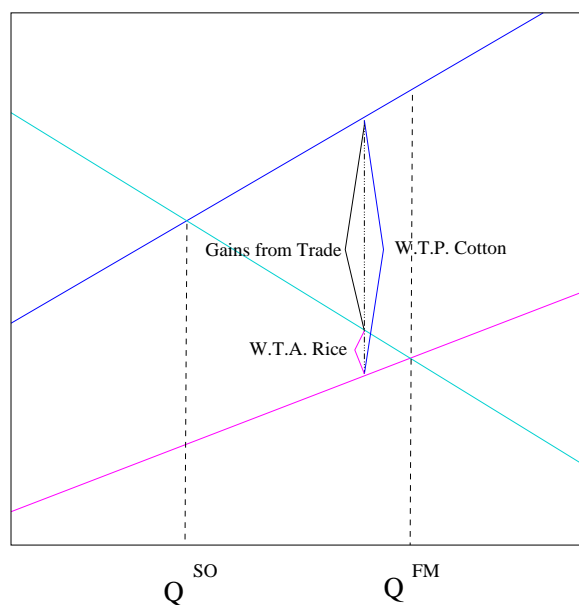
**3. The number of parties involved must be small** This means that few enough people must be involved so that negotiation is feasible.

Let's assume at first that the rice grower has the right to pollute. He will therefore produce quantity  $Q^{FM}$  of rice, since at this point he will just break even on the last unit of rice produced. If negotiation is to take place, each party must have something to gain from striking a bargain.

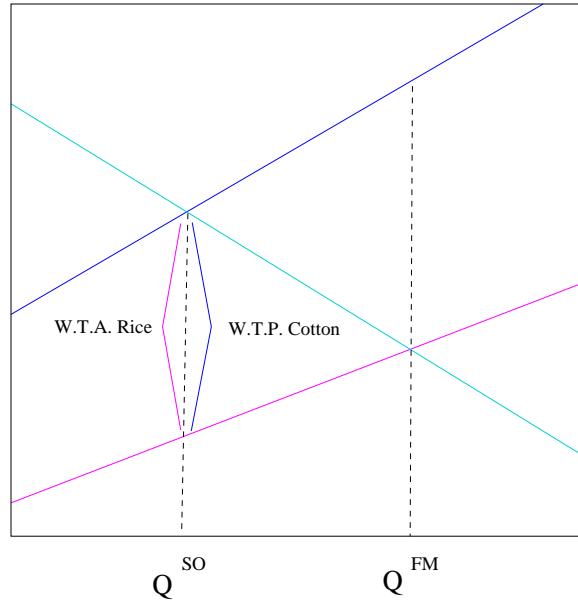
What would the cotton grower gain from convincing the rice farmer to reduce production by one unit? He would avoid the damage to his cotton crop generated at that level of production. We assume that he is *willing to pay* the total value of this averted loss.

The rice grower would need to be compensated for at least his lost profits for producing that last unit. We assume he is *willing to accept* this amount as compensation.

Notice from the graph that initially, the willingness to pay on the part of the cotton grower is larger than the willingness to accept on the part of the rice grower. This difference defines the *gains from trade*. If the gains from trade are positive, a bargain should be possible.



The cotton grower would be willing to pay quite a bit in order to have the rice producer reduce production at first, but as rice production is reduced more and more, the benefits of reduced damage decline and the opportunity costs of lower rice production increase. Bargaining will stop when the gains from trade are exhausted. At this point, the cotton grower's willingness to pay (benefits from pollution reduction) will just equal the rice grower's willingness to accept (lost profits).



Notice, this point occurs at exactly the socially optimal level of production. Therefore, bargaining could potentially resolve the externality problem. Notice also that if you add up the gains from trade for each unit of reduced rice production, you get exactly area  $A$ , which was the net increase in social welfare possible at the free-market outcome.

This is all very well and good, but does it seem that in this particular case, bargaining has resolved the problem? Apparently not. What are some reasons why the Coase theorem might not hold in this particular case? What other factors, potentially not included in Coase's list, might have had an influence in this case?

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