Externalities

• The concept of an externality is quite simple.
  – John and Sam are both located along a lake. John runs a paper mill and Sam uses his property as a vacation cottage. John’s actions influence the pleasure of the vacation cottage.

• There is a distinction between pecuniary and non-pecuniary externalities.
  – If I purchase a widget, it denies you the right to that widget.
  – Since I pay the social cost of the widget, there is no efficiency loss from my purchase.
Externalities

- Non-pecuniary externalities can lead to market failure.
  - John and Sam constitute a non-pecuniary externality

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  - Externalities arise because John does not have to pay for the impact of his paper mill on Sam.

If John pays an appropriate tax for each unit of pollution, the problem disappears.

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The Coase Theorem

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- While we think of John harming Sam, it is also possible to think of Sam harming John.
- Any reduction in the level of pollution is a harm to John.

The Cattle and the Fence

<table>
<thead>
<tr>
<th>Number of Steers</th>
<th>Annual Crop Loss</th>
<th>Crop Loss per Incremental Steer (Tons)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>6</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>10</td>
<td>4</td>
</tr>
</tbody>
</table>

Assume the value of the crop is $1 a ton and that a fence costs $9 a year.

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  - If it wants to have 1, 2, or 3 head of cattle, he will simply pay damages.
  - If he wants 4 or more head of cattle, the fence is the cheaper operation.

Consider two liability rules: The Cattle Owner is Liable and the Farmer is Liable.
The Cattle Owner is Liable

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  – If it wants to have 1, 2, or 3 head of cattle, he will simply pay damages.
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A regulation requiring a fence is clearly wrong.

The Coase Theorem

The Cattle Owner is Liable

• The liability will not cause the farmer to increase the size of his crop.
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    – Suppose a farmer was originally there. The farmer will see no change in his income, though he may now be selling some of his crop to the cattleman rather than to the marketplace.

The Coase Theorem

The Cattle Owner is Liable

• The liability will not cause the farmer to increase the size of his crop.
  • The liability will not cause the farmer to increase the size of his crop.
    – Indeed in some cases, it may lead to less production.
      – Suppose that, absent the cattlemen, the farmer raised $12 of crop at a cost of $10, with a net profit of $2.
      – If the cattleman wants only one steer, it is optimal to pay damages to the farmer.

The Coase Theorem

Overproduction?

• Is it possible the cattle owner’s liability could lead to over-production?
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• Suppose the cows all move along a given path. It would cost $11 to raise $10 of crop along this path.
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The Coase Theorem

The General Result

• The farmer would not plant along this path absent the cattleman, but it might be tempting to threaten to do so to get a bribe of (say) $5 from the cattleman.

Common sense suggests that the crop will not be grown for long. It may happen as a way of maximizing the farmer’s income, but only temporarily.

The General Result

• If the cattleman is liable for damages to the farmer, the optimal level of production will be achieved.

The Coase Theorem

No Liability

• If the cattleman is liable for damages to the farmer, the optimal level of production will be achieved.
• This system requires not only liability but also that the farmer and cattleman have the ability to strike an enforceable bargain.

The Coase Theorem

No Liability

• Let's reverse the situation. The cattleman has no liability: the farmer is liable for any damages.
The Coase Theorem

No Liability

• Lets reverse the situation. The cattleman has no liability: the farmer is liable for any damages.
• Suppose the cattleman has three steers.

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Strategic Behavior?

• Might the cattleman increase the size of his crop to get additional money from the farmer?

In any case, the farmer will not pay more than $9.
Strategic Behavior

• Might the cattleman increase the size of his crop to get additional money from the farmer?
• It is possible once again as a bargaining ploy, but only as a bargaining ploy.
  – In game theory terms, the threat of increasing the size of the herd is not credible.

The General Result

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• The assignment of liability affects the direction of side payments, but not the level of production.
  – Does the cattleman have the right to have cows unfenced?
  – Or does he not?