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Inducing Empathy or Imposing a Fine? Finding Solutions to the Downstream Water Pollution Problem

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Market Report	Yr Ago	4 Wks Ago	8/31/12
Livestock and Products, Weekly Average			
Nebraska Slaughter Steers, 35-65% Choice, Live Weight	$114.00	$118.44	$122.38
Nebraska Feeder Steers, Med. & Large Frame, 550-600 lb.	161.95	156.00	159.88
Nebraska Feeder Steers, Med. & Large Frame 750-800 lb.	131.78	147.83	143.60
Choice Boxed Beef, 600-750 lb. Carcass	183.22	177.89	191.05
Western Corn Belt Base Hog Price Carcass, Negotiated	82.06	88.32	73.47
Pork Carcass Cutout, 185 lb. Carcass, 51-52% Lean	97.02	92.76	82.73
Slaughter Lambs, Ch. & Pr., Heavy, Wooled, South Dakota, Direct	184.87	102.00	94.00
National Carcass Lamb Cutout, FOB	406.99	321.26	315.09
Crops, Daily Spot Prices			
Wheat, No. 1, H.W. Imperial, bu.	7.67	8.11	8.10
Corn, No. 2, Yellow Nebraska City, bu.	7.48	8.08	8.04
Soybeans, No. 1, Yellow Nebraska City, bu.	14.11	16.79	17.37
Grain Sorghum, No. 2, Yellow Dorchester, cwt.	12.39	13.39	13.21
Oats, No. 2, Heavy Minneapolis, MN , bu.	3.84	3.96	4.07
Feed			
Alfalfa, Large Square Bales, Good to Premium, RFV 160-185 Northeast Nebraska, ton.	185.00	242.50	242.50
Alfalfa, Large Rounds, Good Platte Valley, ton.	117.50	220.00	220.00
Grass Hay, Large Rounds, Good Nebraska, ton.	85.00	155.00	160.00
Dried Distillers Grains, 10% Moisture, Nebraska Average.	209.00	302.50	322.50
Wet Distillers Grains, 65-70% Moisture, Nebraska Average.	110.25	115.00	119.00

*No Market

There is a great deal of discussion on the effectiveness of public policies relating to intervention of government into the affairs of people. Some believe in "the invisible hand of the market," while others call for active involvement of the government. Yet both sides tend to agree that in the case where markets fail to deal with too much pollution, government needs to ensure that those who produce water pollution either reduce the levels or compensate society (perhaps through a fine) for the losses. This assumes that people are only self-interested and will not achieve a shared optimal outcome with downstream water users without monetary incentives.

A downstream water pollution problem arises when upstream farmers are implementing practices that lead to soil erosion and chemical/fertilizer runoff, which can be solved using costly conservation technologies. A traditional economics approach which sees only self-interest would lead to proposing a fine (or otherwise increase the costs with regulations) on farmers for the pollution. Such policy may, however, be even more costly, as it would also require (again assuming self-interest only) significant costs for enforcement. A behavioral economics approach looks beyond fines and raising costs, to consider non-pecuniary incentives, i.e., try to nudge the farmer through signals sent from those affected by the pollution. Dual-interest theory (and the metaeconomics approach),[1] suggests that empathy, and as a result joining in sympathy with others for improved water quality, plays an important role in tempering the tendency to pollute. An experiment was conducted in July 2012 in the Experimental and Behavioral Economics Laboratory at the University of Nebraska-Lincoln, where we compared the effectiveness of non-pecuniary nudges (sending a "frowney" face to the upstream farmer) vs. fines.

[1] http://agecon.unl.edu/web/agecon/metaeconomics

In total, 432 individuals participated in the experiment over an eight-day period. The sample included both university students and other members of the community. About one-half were females, with the average age being 29 years (ranging between 19 and 85 years). The experimental sessions took 60-90 minutes, during which the participants earned $45.16 on average, with more being earned by those who expressed mainly a tendency to self-interest.

The results discussed in this article are based on three out of six treatments. Prior to the experiment all participants participated in an activity. Their performance determined the role that they would play, with the top 50 percent earning the role of an upstream farmer and the rest taking the role of a downstream water user. During the experiment the upstream farmer chooses a level of conservation technology on 500 acres of land. The more land put under conservation, the lower the profit will be and the higher the water quality, and thus the higher the monetary gains accruing to the downstream water user. To compensate for a loss in profit, the upstream farmer can require a transfer from the downstream water user. The players achieve a shared optimum if the upstream farmer places 300 acres under conservation, (the highest total profit of 2400 tokens, or 4800 tokens over two rounds; actual money is earned at the rate of 75 tokens = $1). Equal payoffs can be achieved if the upstream farmer transfers 300 tokens from the downstream water user. Depending on the treatment, the downstream water user can react to the decision through sending a "frowney" (inducing empathy), or imposing a fine (monetary decrease in payoff, a cost).

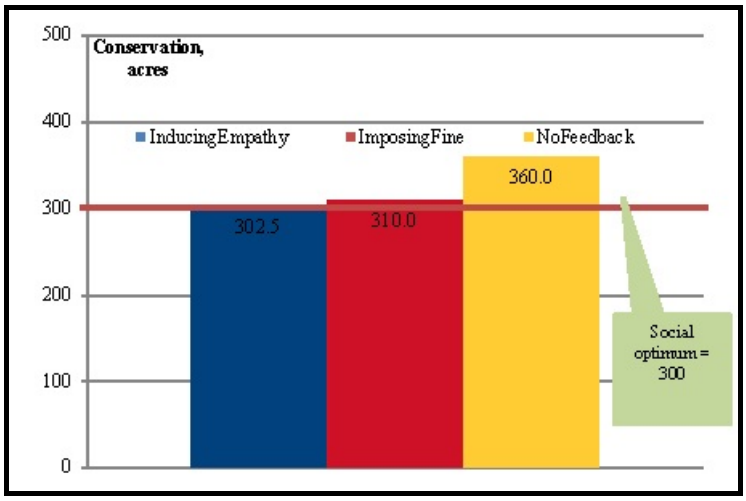

Figure 1. Choice of conservation technology by the upstream farmer in the first round.

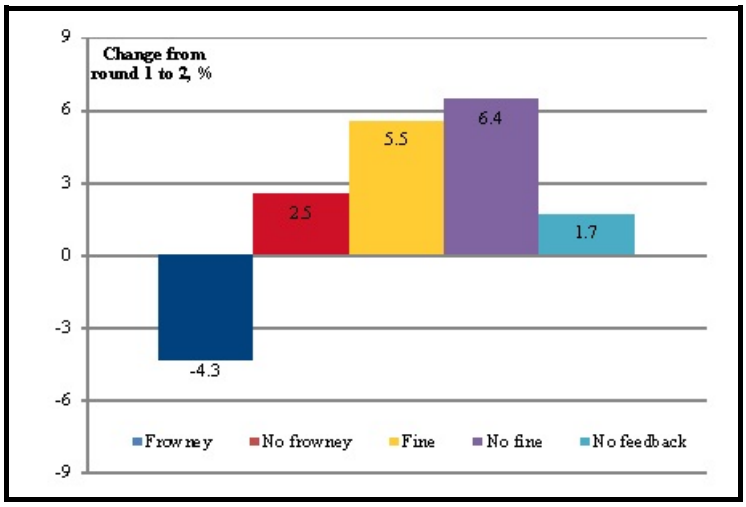

Figure 2. Change in the share of the upstream farmer's payoff in response to various feedbacks.

We found that under both approaches, participants chose levels of conservation technology close to the shared optimal level (Figure 1), suggesting this is about more than self-interest only for each individual. Interestingly, when they did not face the "threat" of feedback (frowney or fine), they were choosing above optimal, shared levels. Furthermore, we found that inducing empathy works better for achieving more equal distributions than imposing a fine. Upstream farmers responded to a frowney face(s) by allocating more payoff to the downstream water users, whereas a fine led frequently to retaliation and less sharing (Figure 2).

This is good news for public policy, suggesting a less costly and more effective solution to the pollution problem. Providing the downstream water user with an opportunity to signal their emotions, which induces empathy-sympathy, yields more efficient and more equal sharing of profits than the more costly use of fines.

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