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Farm Bill 2014: An Experimental Investigation of Conservation Compliance

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Abstract

Leading up to the 2014 Farm Bill, the House of Representatives and the Senate proposed alternative changes to the incentive structure for farmer conservation efforts. While both include crop insurance subsidies, the version proposed by the Senate made such subsidies conditional on conservation efforts. This study uses experimental methods to analyze the efficacy of these two alternative designs in comparison to the previous, 2008 Farm Bill, design and investigates in how far additional nudging for empathy can improve on the efficiency. The results support the contention that solely offering financial incentives, as is the case in the 2014 Farm Bill, leads to crowding-out of intrinsic motivations and hence may be counterproductive. Similarly, nudging for empathy by itself is relatively ineffective. Nudging in conjunction with financial incentives, however, has a statistically and economically significant and positive impact on conservation behavior and may therefore offer a relatively cheap way to improve the efficiency of conservation-related legislative efforts.

Keywords: agricultural policy, conservation policy, empathy, firm behavior, metaeconomics framework

1. Introduction

Current and past farm practices frequently lead and have led to significant environmental degradation in the form of, among others, soil erosion (Note 1) as well as fertilizer and chemical-related water pollution. The United States Department of Agriculture, in consort with the Environmental Protection Agency, has long tried to implement policies to limit the negative effects on the environment. Leading up to the passage of the Agricultural Act of 2014 (H.R. 2642; Pub.L. 113–79,2014; also known, and henceforth referred to, as the 2014 Farm Bill) a lot of the discussion in the Senate and the House of Representatives revolved around how to change farm policies and programs, including the conservation programs, from the 2008 Farm Bill to make them more efficient. Based on estimates by the Congressional Budget Office a continuation of the 2008 Farm Bill policies would have cost almost $1 trillion (Note 2) during the course of the next 10 years. The proposals of the Senate and the House of Representatives for the 2014 Farm Bill both entailed significant spending cuts, including removing direct payments to farmers. In the 2008 Farm Bill these direct payments were conditional on conservation compliance. Other parts of the proposals consolidated the number of conservation programs and reduced mandatory funding. The 2008 Farm Bill also provided substantive subsidies to a crop insurance program administered by the Risk Management Agency, which historically have not been connected to conservation compliance. One key difference between the two proposals by the Senate and the House of Representatives was in the proposed changes as related to conservation compliance, which gives the focus to this study. Both proposals continued to offer crop insurance subsidies, but the version proposed by the Senate, and eventually adopted in the 2014 Farm Bill, made this subsidy conditional on conservation compliance whereas the version proposed by the House of Representatives provided this subsidy without compliance. Such a difference in the incentive structure can potentially result in substantially different levels of conservation effort by farmers. The key differences in terms of incentive structure are highlighted in Table 1.

Table 1. Differences in incentive structures

Policy	Direct Payment	Crop Insurance Subsidy
2008 Farm Bill	Conditional	Unconditional
House Bill	N/A	Unconditional
Senate Bill	N/A	Conditional

Since the crop insurance subsidy is highly valued (virtually all farmers buy crop insurance) and conservation compliance is costly for farmers, the conditional subsidy put into law in the 2014 Farm Bill should be expected, assuming profit maximizing rational individuals, to lead to much higher levels of conservation compliance than if the policy had been modelled after the House version.

Ex-ante it is, nonetheless, unclear which policy design is the most effective. As stressed by Willock et al. (1999), standard economic models that assume profit maximizing-only behavior are ill-suited for predicting behavior in an environmental protection context. Willock et al. (1999) provide evidence that in addition other factors, suggested by economic psychology, going beyond and transcending the usual exclusive focus on self-interest fed by financial incentives, should be taken into consideration. Therefore, even a policy without any financial incentives for the farmers to achieve conservation compliance (such as the bill proposed by the House of Representatives), will not necessarily result in less environmentally friendly and socially responsible behavior (see also Frey & Jegen, 2001; Frey & Oberholzer-Gee, 1997; Gneezy & Rustichini, 2000a, 2000b). Our key objective in this project is, hence, to use experimental methods to compare the effectiveness of the two proposed policy designs leading up to the current 2014 Farm Bill and three modified versions, and provide policy guidelines on what modifications to consider for future farm bills.

The paper proceeds with a brief discussion of the relevant literature, the research questions to be tested in this study, followed by a description of the experimental design and procedures, and a report of the experimental results. The last section of the paper discusses the findings and draws policy implications.

2. Relevant Literature

The traditional economics perspective favors incentives as the most effective tool in achieving environmental objectives, even though providing an incentive of sufficient size to actually nudge behavior could be very costly. The argument, originally presented in work by Becker (1968), Ehrlich (1972) and Stigler (1970), suggests individuals will rationally weigh the benefits and costs of compliance with regulations to decide on the optimal behavior. In addition to the degree, type, and rigorousness of enforcement, financial incentives, in this perspective, are believed to be the most significant determinants of conservation choices. Empirically there is mixed evidence for the efficacy of enforcement, with some studies (e.g. Burby & Paterson, 1993; Winter & May, 2001) confirming a significant, and positive (albeit some only for detection) effect, some studies finding no effect (e.g. Braithweite & Makkai, 1991), and others providing inconsistent conclusions (e.g. Kuperan & Sutinen, 1998). This leaves, according to this viewpoint, financial incentives as the main tool for policy makers to affect behavior. Therefore, in the context of the current and past Farm Bills, an incentive structure with conditional payments, such as the 2008 Farm Bill and the Senate Bill/2014 Farm Bill, would have to be considered more effective than one based on unconditional payments, such as the House Bill, to achieve the conservation compliance objective. (Note 3)

Empirically, there is some evidence to support the contention that incentivized policy designs are more effective than completely voluntary schemes (Jaraitė & Kažukauskas, 2012). However, financial incentives are not unambiguously positive in stimulating desired behavior, and may in fact be counterproductive. Frey and Jegen (2001) call this the crowding out effect – intrinsic motivation to protect the environment or support fellow citizens may be crowded out by extrinsic pecuniary motivation (see also Frey & Oberholzer-Gee, 1997; Gneezy & Rustichini, 2000a, 2000b). This suggests that different parts of the brain may be at work when making decisions that are based on pecuniary and non-pecuniary motivations. Indeed, neuroscience demonstrates that pecuniary rewards activate the pleasure center in the brain, the nucleus accumbens (Knutson, Adams, Fong & Hommer, 2001), whereas altruistic (which generally represent a kind of sacrifice as related to an internalized, shared interest) actions mostly work in the "social center" of the brain, the posterior superior temporal sulcus (Tankersly, Stowe & Huettel, 2007). In the context of this paper this implies that perhaps an incentive structure with only unconditional payments/subsidies, as proposed by the House, is in fact superior in achieving overall increased efficiency.

Even more, the role of empathy should perhaps be explicitly considered in policy making. Berenguer (2007) found that participants who revealed a higher empathy level towards a bird or a tree displayed stronger environmental attitudes and behavior. Shelton and Rogers (1981) showed that empathy-arousing (via role-taking instructions) appeals increase intentions to help. Similarly, Schultz (2000) reported that participants who were instructed to take the perspective (e.g. nudged for empathy) of an animal harmed by pollution score higher on the biospheric environmental concern scale.

In contrast to other theoretical frameworks, the metaeconomics framework (Hayes & Lynne, 2004, 2013; Lynne, 2002, 2006; Sheeder & Lynne, 2011) accounts not only for profit, social, and normative considerations, but also for the neurological evidence of different parts of the brain being responsible for decision making in pecuniary versus non-pecuniary situations, by modeling the decision making process as stemming from two interdependent, joint interests that need to be internally balanced. The dual interest theory, which gives the analytical machinery for the framework, posits that human behavior is not driven by egoistic-hedonistic self-interest only, but is also influenced by an empathy-sympathy based other-interest. Specifically for the context of this paper, the model predicts that a well-designed policy has to consider the dual nature of the interests, and hence neither appeal only to self-interest, nor only to the shared other-interest but rather to a joint, interdependent and nonseparable expression of both interests. Various papers have empirically tested dual interest theory and the dual motive (empirical) model it suggests, and have found substantive supporting evidence for its validity (see for example Bishop, Shumway & Wandschneider, 2010; Chouinard, Paterson, Wandschneider & Ohler, 2008; Kalinowski, Lynne & Johnson, 2006; Ovchinnikova, Czap, H., Lynne & Larimer, 2009; Sautter, Czap, N., Kruse & Lynne, 2011; Czap, N., Czap, H., Khachaturyan, Lynne & Burbach, 2012).

3. Research Questions

Based on the metaeconomic framework and the findings by Frey and Jegen (2001), Frey and Oberholzer-Gee (1997), and Gneezy and Rustichini (2000a, 2000b) it is unclear what kind of incentive structure leads to the best outcome in terms of conservation behavior. Leading up to the passage of the 2014 Farm Bill two different changes to the 2008 Farm Bill were proposed and it stands to reason that further revisions will happen in future farm bills. As such it is important from both a theoretical but also practical policy application perspective to determine the impact of changes in the incentive structure and derive guidelines on how to optimize policy in the future.

Specifically, we want to test herein whether (a) the 2008 Farm Bill design, the incentive structure based on the Senate proposal (which was adopted in the 2014 Farm Bill) or the House version demonstrates superior performance, (b) nudging for empathy has a significant impact on conservation behavior, and (c), following the meteconomic theory, the combination of pecuniary incentives and empathy nudging is superior to either one incentive/nudge individually. For assessment/ranking we define superior based on four potential objectives of public policy (Table 2).

Table 2. Policy objectives

Level of conservation/ Degree of conservation compliance	Distribution of social gains
1. Highest level of average conservation 2. Highest frequency of over-compliance 3. Lowest share of zero conservation	4. Largest proportion choosing an equal distribution of profits

Traditional economics typically assumes a representative agent, and thus homogeneity of characteristics. As a consequence most economic analyses focus on the average (i.e. objective 1 in Table 2). Instead, we consider heterogeneity of economic agents (for a modelling approach see for example Giannakas and Kaplan (2005)) in their degree of empathy (Note 4). This allows analyzing the distribution or share (i.e. objectives 2-4 in Table 2), and hence provides additional policy relevant information.

4. Experimental Design and Procedures

In this paper we consider the upstream-downstream pollution problem in which an upstream farmer chooses the level of conservation on their land, which affects the extent of soil erosion and chemical runoff into a river, which, in turn, affects the pollution level of the downstream lake that is utilized by a downstream water user. In

terms of experimental economics, the conservation choice of upstream farmers and its impact on downstream water users bears, at least from an individual farmer's perspective, similarities to a dictator game. It is realistic to assume that each farmer considers ownself too small to affect policy making through own behavior. Since externalities are, by definition, not priced into the product, the farmer has no price signal that would point to a socially optimal behavior, with the individual farmer in effect in a monopolistic position concerning conservation choices. The solution, based on traditional economics, is to design public policy that provides financial incentives to achieve market based self-regulation, and, if this fails (due to the high costs of such policies, especially relative to the capacity for payment from limited tax dollars), then the frame turns to coercive, mandatory regulations and direct control of farmer choices. As discussed before, findings in experimental/behavioral economics and economic psychology hint at empathy as a driving force of human behavior and thus support supplementing or, perhaps, substituting these traditional approaches by nudging individuals towards walking-in-the-shoes-of-others.

4.1 Baseline Upstream-Downstream Pollution Game

To analyze the effectiveness of the various proposed policy designs in the aforementioned context of an upstream-downstream water pollution problem we used a framed laboratory experiment. There were two players in the game. One of the players took on the role of Upstream Farmer (UF) deciding on the level (in number of acres [0-500]) of Conservation Technology (CT) to be used on their land. Compared to intensive tillage, doing conservation tillage (i.e. using conservation technology) means that the land is disturbed minimally leading to less soil erosion, lower chemical runoff and overall higher drinking water quality of the downstream rivers and lakes and thus is a relatively less harmful agricultural practice. However, CT is more costly for the farmer, as represented in things like the increased uncertainty of planting dates due to more residues being left on the field. The other player represents a user of drinking water living downstream, henceforth called Downstream Water User (DWU), who is affected by the consequences of the decision by the Upstream Farmer.

The setup of the baseline version of the game (referred to as *2008 Policy*) is based on a standard dictator game (Kahneman, Knetsch & Thaler, 1986). A decision by the UF (dictator) to put land under CT increases the net profit of the DWU (recipient) and decreases the net profit of the UF. The game was played in context, meaning that the situation resembles the policy for agricultural conservation practices under the 2008 Farm Bill. The UF got a crop insurance subsidy (CIS) to offset part of the crop insurance premium and a direct payment (DP) that was conditional to the conservation compliance (in our case the level of CT had to be equal to or greater than the conservation compliance level of CT, referred to as CT_{CC}). The conditional direct payment provided a financial incentive for the UF to engage in socially desirable/environmentally-friendly behavior. To reflect the fact that public money is used to pay subsidies and direct payments, part of the direct payment was paid from the profit of DWU. The profit function for the UF in the baseline treatment was hence given as:

$$Profit\ of\ UF\ from\ farming = Baseline\ Income_{UF} - 2 * CT \tag{1}$$

$$Net\ Profit_{UF} = \begin{cases} Profit\ of\ UF\ from\ farming + CIS, & if\ CT < CT_{CC} \\ Profit\ of\ UF\ from\ farming + CIS + DP, & if\ CT \geq CT_{CC} \end{cases} \tag{2}$$

while the profit function of DWU was:

$$Profit\ of\ DWU = Baseline\ Income_{DWU} + 2 * CT \tag{3}$$

$$Net\ profit\ _{DWU} = \begin{cases} Profit\ of\ DWU - \frac{1}{3} * CIS, & if\ CT < CT_{CC} \\ Profit\ of\ DWU - \frac{1}{3} * CIS - \frac{1}{3} * DP, & if\ CT \geq CT_{CC} \end{cases} \tag{4}$$

The respective values for the parameters used in the experiment are given in Table 3. The Nash equilibrium for the UF was to choose a zero level of conservation technology. In this sense the decision of the UF to use non-zero levels of conservation technology is similar to altruistic giving in a dictator game.

Table 3. Parameter values for profit functions

Parameter	Level
$Baseline\ Income_{UF}$	1500 tokens
$Baseline\ Income_{DWU}$	500 tokens
CT	chosen by UF: 0-500 acres
CT_{CC}	250 acres
CIS	200 tokens
DP	100 tokens
$newCIS$	300 tokens

It is worthwhile noting that the game is a zero sum game: the payoffs of UF and DWU always add up to the same amount. This was done to ensure that maximizing joint payoffs for UF and DWU was not part of the choice set. Deciding on CT of 250 represents an even split between environmentally friendly farming and a more traditional/profit oriented farming choice. A choice of CT of 350 acres was the egalitarian outcome in which UF and DWU obtain the exact same payoff.

4.2 Experimental Treatments

We designed four treatments resembling four possible public policies. Treatment 1 (referred to as *House version*) had an incentive structure based on the House of Representatives Farm Bill proposal. As noted, in this version the direct payments are eliminated, but the farmers could still receive a CIS. We increased CIS to newCIS in order to make the treatments comparable, i.e. avoid a possible income effect of the eliminated DP. The crop insurance subsidy was now independent of conservation compliance. This means that the farmers did not see a financial link between the subsidies and their conservation compliance. The net profits were:

$$Net\ Profit_{UF} = Profit\ of\ UF\ from\ farming + newCIS \tag{5}$$

$$Net\ profit\ _{DWU} = Profit\ of\ DWU - \frac{1}{3} * newCIS \tag{6}$$

Treatment 2 (referred to as *Senate version*) was based on the Senate's proposal, which was mostly adopted in the 2014 Farm Bill. As noted, in this version the direct payments were also eliminated. However, newCIS was conditional on conservation compliance. The net profit was:

$$Net\ Profit_{UF} = \begin{cases} Profit\ of\ UF\ from\ farming, & if\ CT < CT_{CC} \\ Profit\ of\ UF\ from\ farming + newCIS, & if\ CT \geq CT_{CC} \end{cases} \tag{7}$$

$$Net\ profit\ _{DWU} = \begin{cases} Profit\ of\ DWU, & if\ CT < CT_{CC} \\ Profit\ of\ DWU - \frac{1}{3} * newCIS, & if\ CT \geq CT_{CC} \end{cases} \tag{8}$$

Treatments 3 & 4 (referred to as *Senate + Nudging* version and *House + Nudging* version respectively) combined the features of treatments 1 & 2 with empathy nudging. The net profits in treatments 3 & 4 were the same as in the corresponding treatments 1 & 2. The difference was that in these treatments the DWU could send a message to the UF nudging for empathy/walking-in-the-shoes-of-other before the UF made a decision about conservation.

The messages were based on the perspective taking and fantasy subscales of the Interpersonal Reactivity Index (Davis, 1980, 1983) which is a measure of dispositional empathy. The fantasy subscale contains seven statements such as "I daydream and fantasize, with some regularity, about things that might happen to me" and "I really get involved with the feelings of the characters in a novel". The perspective taking subscale contains seven statements such as "I try to look at everybody's side of a disagreement before I make a decision" and "When I'm upset at someone, I usually try to 'put myself in his shoes' for a while". After determining the key elements from each statement and eliminating overlap (for example we used only one of the two following questions: "look at everybody's side" and "look at both sides of the question"), we were left with 6 key phrases. We modified the phrases into meaningful messages that the DWU could send to the UF, e.g. "Before choosing the level of CT this round, please see your decision from my point of view". We used two types of phrasing: more personal (e.g. my point of view, my perspective, in my place) and more general (e.g. DWU's point of view, DWU's perspective, in the DWU's place). For a list of messages see Appendix A.

4.3 Procedures and Subjects

The participants' decisions were tracked throughout the experiment using a 5-digit random number to assure anonymity. Prior to the actual experiment, the participants took a farming quiz. They were informed that their performance on the quiz determined their role in the experiment and how much control they would have over their cash earnings. This quiz contained questions testing participants' knowledge of basic farming issues, including agricultural practices, technologies, and public policies. This was done for two reasons: (a) many farmers have worked their land for generations and thus feel that they have earned the right to farm the way they want. Having earned the position through performing better at a quiz on farming instills a similar feeling, albeit perhaps to a lesser degree, in the subjects; (b) Subjects with more knowledge of farming practices were more likely to have some farming background and hence could more easily identify with the role of a farmer. Since the experiment is in context, this is an important element. In each session the subjects were ranked by their quiz performance with the speed of completion used to break ties. The top 50% of subjects in the session earned the right to play the role of UF and the rest played as a DWU.

After the participants completed the quiz and received feedback on their performance (top 50% or bottom 50%), they read the experimental instructions for Rounds 1-10 on the computer screen. A summary of the instructions was also read aloud to ensure that participants knew that all subjects had the same set of instructions. In addition, each subject received a handout containing the summary of instructions for Rounds 1-10 (see Appendix B) and a table with possible payoffs for the UF as well as for the DWU. Before the experiment began, participants had to answer correctly questions checking their understanding of the instructions and the calculation of the payoffs. After the completion of Round 10, the participants read a new set of instructions, received a new summary of instructions, and heard it being read aloud (Appendix C-F).

Participants played the game for 20 rounds in total in a "partner matching" design. For the first 10 rounds all participants played the baseline game (2008 Farm Bill). For Rounds 11-20 participants were assigned to one of the 4 treatments described above. The reason for doing such a sequential setup, with the baseline always first, was to establish the 2008 Farm Bill as the status quo policy, just like in the real world.

In total, 400 subjects participated in the experiment: 100 in each treatment, resulting in 50 independent observations per treatment. All subjects were recruited at the University of Nebraska – Lincoln and the community at large (the majority were students, 50% females, of age 19 to 78, with an average age of 26.3 years). Thirty-seven percent of our participants grew up in a rural area and 71% indicated they have farmers in their families. 97% of the subjects playing upstream farmers indicated in a "reality check" that they were imagining themselves being farmers during the experiment.

The experiment was conducted in the Experimental and Behavioral Economics Laboratory at the University of Nebraska-Lincoln. All sessions were computerized and administered using the software z-Tree (Fischbacher 2007). Each session took up to 90 minutes. The tokens that the participants earned during the experiment (sum of payoffs in 20 rounds) were converted into dollars ($1=500 tokens) and paid to the participants privately in cash, with average earnings of $43.6. (Note 5)

5. Experimental Results

The next several figures illustrate the results for the various policy objectives that are considered in this paper. Not surprisingly, and in line with typical findings in the dictator game literature, subjects did not on average converge to the Nash equilibrium of maximizing own profits, but rather exhibited some type of sharing behavior (Note 6). As apparent from Fig. 1, the average (Note 7) amount of conservation tillage chosen under the 2008 Farm Bill policy did not differ much from what was chosen in the Senate version or the House version of the Bill.

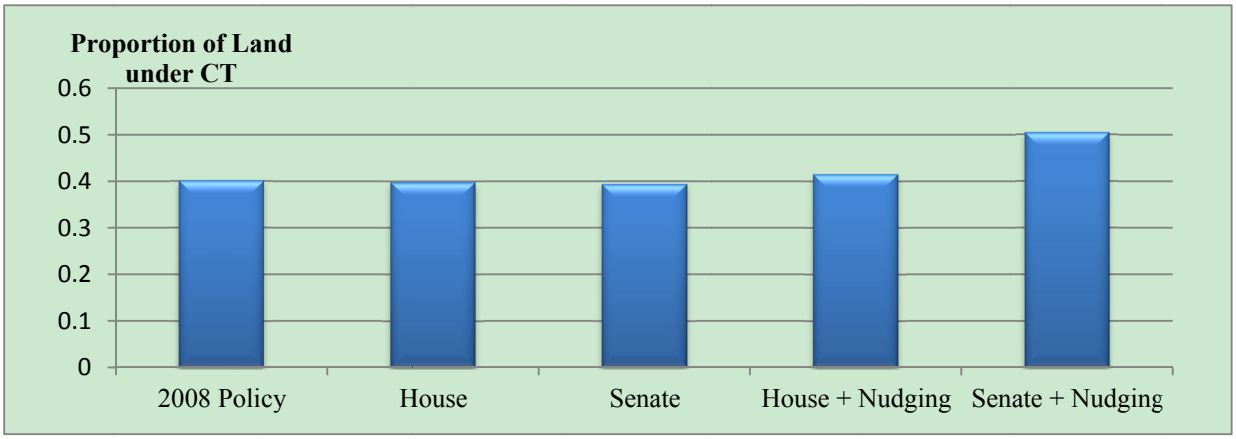

Figure 1. Average proportion of land under conservation technology

Even though the House version with added nudging did perform slightly better (Fig.1), this difference was not statistically significant. The Senate version with nudging did significantly better (p-value < 0.01 for the Mann–Whitney-Wilcoxon rank sum test) than the Senate version without nudging. The lack of statistical significance between the Senate and House version suggests that the financial incentive simply compensates for the crowding-out effect that has been shown in Frey and Jegen (2001), Frey and Oberholzer-Gee (1999) and Gneezy and Rustichini (2000a, 2000b). To achieve better results a policy has to not only provide financial incentives but also counteract the impact of this crowding-out by, for example, opening communication channels between the decision maker and the affected party to allow for empathy nudging. It is interesting that the House version does not benefit from this nudging. This may indicate that subjects already are empathetic due to the payment they are receiving, a kind of reciprocity. Trying to push them further to be empathetic will not be effective. Reminding them of empathy when there is crowding out (i.e. when financial incentives are provided), though, is effective.

Not surprisingly, based on the previous discussion, the Senate version, with its financial incentives, pushed people to behave as profit maximizers, i.e. choose zero CT (Fig.2). The difference between the Senate version and all other policies was large and statistically highly significant (p-value<.01). Again, as in the previous graph, this was counteracted effectively with nudging. The Senate + Nudging version had a statistically significant lower percentage of profit maximizers than the 2008 policy (p-value<.01), the House version without nudging (p-value<.05), and the House + Nudging version (p-value<.05).

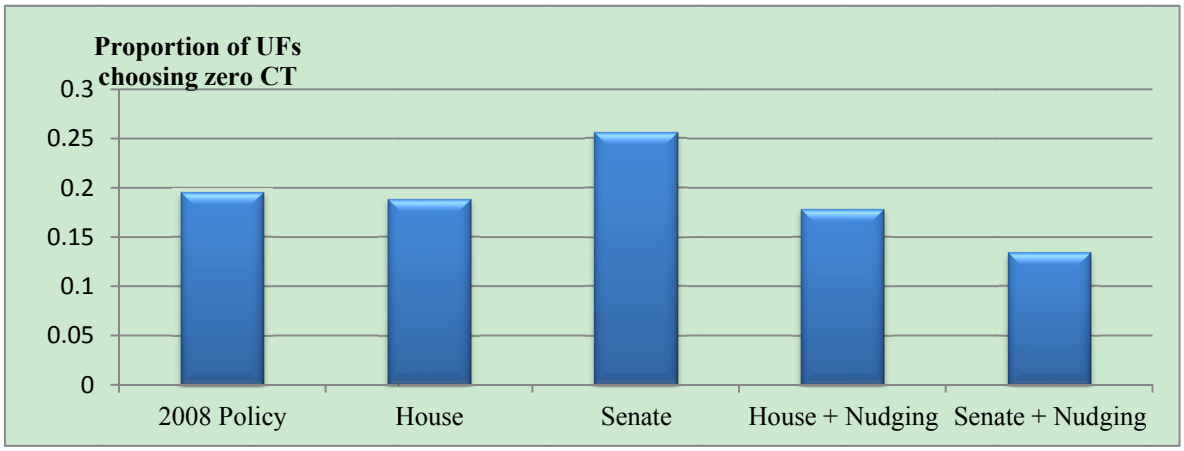

Figure 2. Profit maximization (CT=0 acres)

When it comes to going beyond the incentive threshold of 250 acres under conservation, the results again underline the effectiveness of nudges for increasing CT (see Fig. 3). There was a substantial and statistically significant (p-values<.01) difference between the first three and the last two policy designs (Fig.3). Generally, the nudging treatments performed much better than the alternatives discussed prior to (and including) the 2014 Farm Bill in terms of environmental protection.

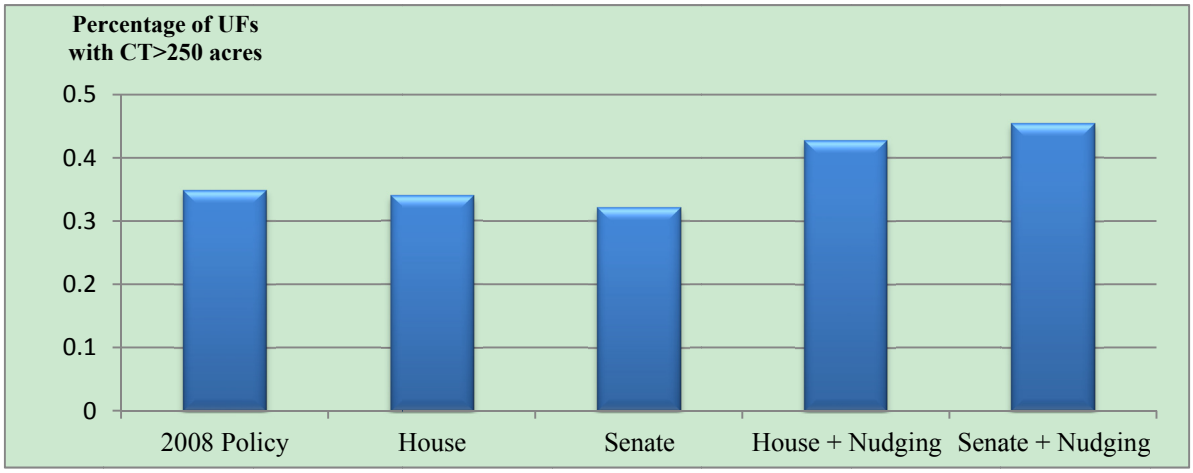

Figure 3. Going beyond: over-compliance

The nudging treatments did not only show superior performance in terms of increased conservation efforts, but also when it came to distributional aspects (Fig. 4). The two nudging treatments provided the largest percentage of people going for an even split in profits (p-value<.01).

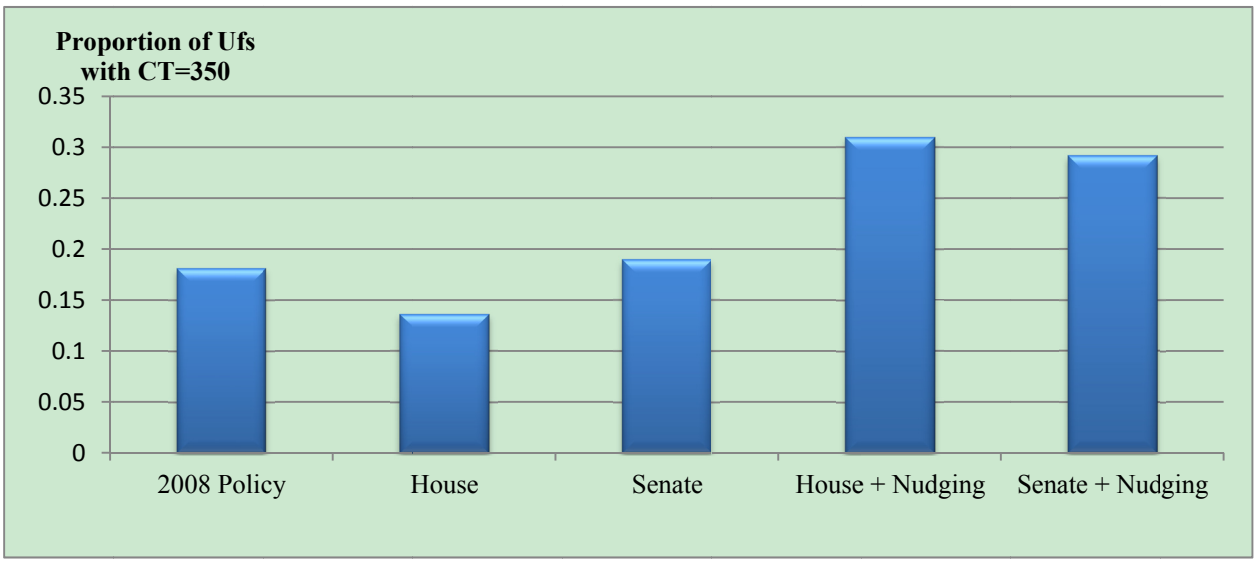

Figure 4. Balance of profits: equal profits of UF and DWU

Together with the results presented on Fig. 3, this strongly suggests that any policy that aims to increase income/welfare equality should not resort to pecuniary incentives only, but provide venues for empathy nudging as well.

The above results were based on pairwise comparisons to establish statistical significance. To obtain a more complete picture of the impact of the respective policy designs we estimated a Tobit regression (Table 4) using the 2008 policy as the baseline case.

Table 4. Tobit Regression with CT as dependent variable – 2008 policy is the baseline case

Independent Variables	Coefficient
Intercept	184.42***
D_House (1=Yes)†	1.29
D_Senate (1=Yes) †	-9.98
D_House x D_Nudging (1=Yes) †	8.52
D_Senate x D_Nudging (1=Yes) †	60.64***

† - Dummies for each treatment

Significance level: *** - significant at the 1% level

Log-likelihood: -21639.6

NOTE: The dependent variable CT is truncated between 0 and 500 acres.

The estimation results of this regression confirmed the descriptive results presented in Fig. 1, with the conservation effort under the Senate version with nudging statistically and economically significantly larger than under the incentive structure based on the 2008 Farm Bill. The coefficient of 60.64 for the Senate version with nudging represents a more than 30% increase in acres placed under conservation compared to the baseline case of the 2008 Farm Bill. These results hold also when controlling for additional factors like gender, age, whether the subjects thought the assignment of roles was fair, and whether the subjects playing the upstream farmer actually imagined themselves in the positon of an upstream farmer.

6. Discussion and Policy Design

The results presented in this paper have important implications for effective policy making and program design. We ranked the policy designs considered in this experiment according to their performance on the four policy objectives (Table 5). The distributional rank was constructed based on the proportions of equal profits of UF and DWU. The conservation ranking was derived by calculating the average rank of each policy design across the three conservation objectives and ranking these average ranks.

Table 5. Ranking of policy designs

Policy	Overall Rank ("1" is the best)	
	Conservation	Distributional
2008 policy	3	4
House	4	5
Senate	5	3
House + Nudging	2	1
Senate + Nudging	1	2

If enforcement is cheap and effective, a command and control approach is a feasible policy. However, using enforcement to reduce non-point pollution is not easy (and hence not cheap). Furthermore, U.S. farmers are likely to resist a coercive, direct regulation in contrast to a policy based on voluntary participation, with a predictable backlash, and perhaps even less conservation effort (e.g. Armstrong, Ling, Stedman & Kleinman, 2011). Hence, such enforcement could be a very costly policy, and we need to search for alternatives to ensure the desired behavior. In the process of designing the 2014 Farm Bill, the House of Representatives and the Senate proposed two such designs, with the former providing no financial incentive for conservation compliance and the latter providing a financial reward conditional on compliance. In terms of overall conservation both approaches turned out to be slightly, albeit statistically insignificantly, less effective than the 2008 Farm Bill policy. In the experiment the non-incentivized policy was assumed to be at least as costly as the 2008 Farm Bill policy and the incentivized policy, due to the conditionality of the subsidies in the latter two. Given that a larger share of the subsidy is incentivized under the Senate version, this would have to be considered the most

cost-effective way of encouraging conservation behavior by subjects. In summary, withholding subsidies for lack of conservation compliance is not more effective in encouraging conservation compliance, but costs less money and should therefore be considered the superior policy.

What is typically ignored in the current policy debate is the role of empathy. Current policies also assume a representative farmer, who fits the mold of the *homo economicus* only frame. In reality, farmers are heterogeneous in their degree of empathy, their ability to walk-in-the-shoes-of-others, and their preferences for pecuniary gains. And, by no means, is the profit-maximizing individual the median characteristic. As predicted by dual interest theory individuals are driven by both, egoistic-hedonistic self-interest as well as empathy-sympathy based other(shared ethic)-interest. We find evidence for this in the observation that only the combination of increased pecuniary incentives (appealing to the egoistic-hedonistic self-interest) AND nudging for empathy (appealing to other(shared ethic)-interest) is effective in achieving more balanced decisions, providing financial and environmental gains to upstream farmers as well as downstream water users. This more balanced behavior is evident in both the share of people willing to engage in self-sacrifice as well as the average magnitude of such. Interestingly, when the objective is an equal distribution of profits, financial incentives do not matter. The policy design without financial incentives but with empathy nudging (i.e. the House version + Nudging) fares slightly, but statistically insignificantly, better than the policy design with financial incentives and empathy nudging (i.e. the Senate version + Nudging).

Theoretically, these results also offer an intriguing extension to the finding of crowding-out effects on intrinsic motivations through extrinsic pecuniary incentives by Frey and Jegen (2001), Frey and Oberholzer-Gee (1997), and Gneezy and Rustichini, (2000a, 2000b). In line with the aforementioned authors, we find evidence of crowding-out if extrinsic pecuniary motivations are introduced. However, even a fairly weak extrinsic reminder of these intrinsic motivations alleviates the problem of crowding-out and leads to strong positive effects. From a more practical policy perspective this suggests that designing public policy for a shared, social good, such as the environment, based on the assumption of a profit-maximizing representative economic agent is inefficient at best, and possibly counterproductive if crowding-out of intrinsic motivations is significant. Opening communication channels between affected parties and polluters/farmers (such as town hall meetings, agricultural extension meetings, local newspapers, crop insurance enrollment literature/meetings, etc.), including written/verbal reminders of the "shared we" (for example in the communication of new regulations to the farmer), and nudging to walk-in-the-shoes-of-others (possibly through social media) are all cheap, easy tools to dramatically improve the efficiency of public policy.

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Notes

Note 1. According to the Natural Resources Conservation Service (NRCS) in 2007 alone there was soil erosion of about 1.7 billion tons

Note 2. Congressional Budget Office Cost Estimate (July 26, 2012), H.R. 6083, Federal Agriculture Reform and Risk Management Act of 2012

Note 3. Providing increased insurance subsidies may, however, lead to increased risk taking, increased acreage, and other environmentally suboptimal decisions (see Goodwin, Vandeveer and Deal (2004) and Walters, Shumway, Chouinard and Wandschneider (2012) for a discussion). This is not further considered in this paper, but needs to be part of the overall evaluation of the proposed/implemented policies.

Note 4. We are not claiming that there is homogeneity in producer skills, but for the purpose of our study it is more relevant to focus solely on empathy as a differentiating criterion.

Note 5. This roughly corresponds to the incentive payments in recent experiments (e.g. Cubitt, Drouvelis & Gächter, 2011; Duffy & Kornienko 2010). Opportunity costs (reported average hourly wage) of subjects was $10.8

Note 6. It is difficult to compare the degree of sharing in this experiment to previous dictator games, because the context and design of this experiment differs substantially. This is of secondary importance for the purpose of this paper, because we are mainly interested in the relative performance of the policy designs.

Note 7. Across rounds and individuals

Appendix

A. List of Messages in Empathy nudging treatments

Personal message	**General message**
Before choosing the level of CT this year, please...	
... see your decision from my point of view	... see your decision from the DWU's point of view
... understand my situation better by imagining how your decision looks from my perspective	... understand the DWU's situation better by imagining how your decision looks from the DWU's perspective
... look at both your and my side	... look at both your and the DWU's side
... put yourself in my place	... put yourself in the DWU's place
... try to put yourself in my shoes for a while	... try to put yourself in the DWU's shoes for a while
... imagine how you would feel in my place	... imagine how you would feel in the DWU's place

Appendices B-F. Summary of instructions given to the participants

B. Baseline (2008 Farm Bill), rounds 1-10 [distributed to all players]

Basics:

- The game will be played for 20 rounds with the same person
- Your earnings will consist of the sum of your net profit in 20 rounds
- The exchange rate is $1=500 tokens
- Your cash earnings will be paid to you privately
- Your decisions are confidential and anonymous
- Communication with other participants is not allowed

Stages of a round:

Stage 1: Upstream Farmer's decision on Conservation Tillage

Upstream Farmer decides how much of his/her 500 acres of farming land to place under Conservation Tillage (CT). Various possible payoffs (in tokens) are presented in the table below.

NOTE: UF can choose any amount of acres between 0 and 500, it does not have to be a number from the table.

Level of CT, acres	UF's profit from farming	Crop Insurance Subsidy to UF	Direct Payment to UF	**UF's net profit**	DWU's profit	Part of CIS paid by DWU	Part of DP paid by DWU	**DWU's net profit**
0	1500	200	0	**1700**	500	67	0	**433**
50	1400	200	0	**1600**	600	67	0	**533**
100	1300	200	0	**1500**	700	67	0	**633**
150	1200	200	0	**1400**	800	67	0	**733**
200	1100	200	0	**1300**	900	67	0	**833**
250	1000	200	100	**1300**	1000	67	33	**900**
300	900	200	100	**1200**	1100	67	33	**1000**
350	800	200	100	**1100**	1200	67	33	**1100**
400	700	200	100	**1000**	1300	67	33	**1200**
450	600	200	100	**900**	1400	67	33	**1300**
500	500	200	100	**800**	1500	67	33	**1400**

Stage 2: Information about profit:

Downstream Water User and Upstream Farmer will be given information about:

(1) Level of Conservation Tillage chosen by Upstream Farmer

(2) Net profits of UF and DWU

C. Treatment 1 (House version, i.e. Non-incentivized Conservation Compliance), rounds 11-20 [distributed only to the players in the respective treatment]

Stages of a round:

Stage 1: Upstream Farmer's decision on Conservation Tillage

Same as in rounds 1-10, Upstream Farmer decides on CT. The new payoffs (in tokens) for various choices of CT are presented in the table below.

NOTE: UF can choose any amount of acres between 0 and 500, it does not have to be a number from the table.

Level of CT, acres	UF's profit from farming	Crop Insurance Subsidy to UF	**UF's net profit**	DWU's profit	Part of CIS paid by DWU	**DWU's net profit**
0	1500	300	**1800**	500	100	**400**
50	1400	300	**1700**	600	100	**500**
100	1300	300	**1600**	700	100	**600**
150	1200	300	**1500**	800	100	**700**
200	1100	300	**1400**	900	100	**800**
250	1000	300	**1300**	1000	100	**900**
300	900	300	**1200**	1100	100	**1000**
350	800	300	**1100**	1200	100	**1100**
400	700	300	**1000**	1300	100	**1200**
450	600	300	**900**	1400	100	**1300**
500	500	300	**800**	1500	100	**1400**

Stage 2: Information about profit:

Same as in rounds 1-10.

D. Treatment 2 (Senate version, i.e. Incentivized Conservation Compliance), rounds 11-20 [distributed only to the players in the respective treatment]

Stages of a round:

Stage 1: Upstream Farmer's decision on Conservation Tillage

Same as in rounds 1-10, Upstream Farmer decides on CT. The new payoffs (in tokens) for various choices of CT are presented in the table below.

NOTE: UF can choose any amount of acres between 0 and 500, it does not have to be a number from the table.

Level of CT, acres	UF's profit from farming	Crop Insurance Subsidy to UF	**UF's net profit**	DWU's profit	Part of CIS paid by DWU	**DWU's net profit**
0	1500	0	**1500**	500	0	**500**
50	1400	0	**1400**	600	0	**600**
100	1300	0	**1300**	700	0	**700**

150	1200	0	**1200**	800	0	**800**
200	1100	0	**1100**	900	0	**900**
250	1000	300	**1300**	1000	100	**900**
300	900	300	**1200**	1100	100	**1000**
350	800	300	**1100**	1200	100	**1100**
400	700	300	**1000**	1300	100	**1200**
450	600	300	**900**	1400	100	**1300**
500	500	300	**800**	1500	100	**1400**

Stage 2: Information about profit:

Same as in rounds 1-10.

E. Treatment 3 (House version & Empathy Nudging), rounds 11-20 [distributed only to the players in the respective treatment]

Stages of a round:

Stage 0: Downstream Water User's message to Upstream Farmer

Before Upstream Farmer makes a decision, Downstream Water User can send Upstream Farmer a message.

Stage 1: Upstream Farmer's decision on Conservation Tillage

Same as in rounds 1-10, Upstream Farmer decides on CT. The new payoffs (in tokens) for various choices of CT are presented in the table below.

NOTE: UF can choose any amount of acres between 0 and 500, it does not have to be a number from the table.

Level of CT, acres	UF's profit from farming	Crop Insurance Subsidy to UF	**UF's net profit**	DWU's profit	Part of CIS paid by DWU	**DWU's net profit**
0	1500	300	**1800**	500	100	**400**
50	1400	300	**1700**	600	100	**500**
100	1300	300	**1600**	700	100	**600**
150	1200	300	**1500**	800	100	**700**
200	1100	300	**1400**	900	100	**800**
250	1000	300	**1300**	1000	100	**900**
300	900	300	**1200**	1100	100	**1000**
350	800	300	**1100**	1200	100	**1100**
400	700	300	**1000**	1300	100	**1200**
450	600	300	**900**	1400	100	**1300**
500	500	300	**800**	1500	100	**1400**

Stage 2: Information about profit:

Same as in rounds 1-10.

F. Treatment 4 (Senate version & Empathy Nudging), rounds 11-20 [distributed only to the players in the respective treatment]

Stages of a round:

Stage 0: Downstream Water User's message to Upstream Farmer

Before Upstream Farmer makes a decision, Downstream Water User can send Upstream Farmer a message.

Stage 1: Upstream Farmer's decision on Conservation Tillage

Same as in rounds 1-10, Upstream Farmer decides on CT. The new payoffs (in tokens) for various choices of CT are presented in the table below.

NOTE: UF can choose any amount of acres between 0 and 500, it does not have to be a number from the table.

Level of CT, acres	UF's profit from farming	Crop Insurance Subsidy to UF	**UF's net profit**	DWU's profit	Part of CIS paid by DWU	**DWU's net profit**
0	1500	0	**1500**	500	0	**500**
50	1400	0	**1400**	600	0	**600**
100	1300	0	**1300**	700	0	**700**
150	1200	0	**1200**	800	0	**800**
200	1100	0	**1100**	900	0	**900**
250	1000	300	**1300**	1000	100	**900**
300	900	300	**1200**	1100	100	**1000**
350	800	300	**1100**	1200	100	**1100**
400	700	300	**1000**	1300	100	**1200**
450	600	300	**900**	1400	100	**1300**
500	500	300	**800**	1500	100	**1400**

Stage 2: Information about profit:

Same as in rounds 1-10.