## Applying Behavioral and Experimental Economics to U.S. Agri-Environmental Programs: Benefits, Challenges, and Lessons Learned

### Kent D. Messer

University of Delaware, Co-Director of CBEAR



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# Thank you and Outline of Talk

Thank you

- Peter Boxall
- Valerie Johnson
- Brydie Brown
- 1. History of CBEAR and applying behavioral and experimental economics to agri-environmental programs in the US
- 2. Successes
- 3. Challenges



4. Lessons Learned

# Application of Nudges to Policy







Behavioral & Experimental Agri-Environmental Research



- Individual utility-maximizing consumer decisions
- Decisions primarily on private goods

# Agri-Environmental Context in the US



- Decisions by profit-maximizing producers and landowners
- Decision are on items that have both private and public components
- Often decisions with large stakes

8 chavioral & Experimental gri-Environmental Research History of CBEAR and applying behavioral and experimental economics to agri-environmental programs in the US The White House Office of the Press Secretary For Immediate Release September 15, 2015 Executive Order -- Using Behavioral Science Insights to Better Serve the American People EXECUTIVE ORDER USING BEHAVIORAL SCIENCE INSIGHTS TO BETTER SERVE THE AMERICAN PEOPLE A growing body of evidence demonstrates that behavioral science insights -- research findings from fields such as behavioral economics and psychology about how people make decisions and act on them -- can be used to design government policies to better serve the American people.

In 2014, the White House launched the Social and Behavioral Sciences Team (nudge squad).

In 2014, CBEAR established through a national competition by the USDA Economic Research Service.

In September 2015, President Obama issued the Executive Order entitled "Using Behavioral Science Insights to Better Serve the American People"

• "To more fully **realize the benefits of behavioral insights** and **deliver better results at a lower cost** for the American people, the Federal Government should design its policies and programs to reflect our best understanding of how people engage with, participate in, use, and respond to those policies and programs."



In 2019, CBEAR's funding renewed in through a grant from USDA National Institute for Food and Agriculture.

## Motivation of Applying Behavioral Insights

- Non-political. Goal is helping programs work better, better serve their customers, and being cost-effective with taxpayer money.
- Nudges have worked in other contexts. Program changes can be relatively <u>small adjustments</u> that are <u>within the</u> <u>control</u> of a program administrator.
  - Do not require additional funds or new legislation to be passed.
  - May work well with **voluntary programs**.
- **Testing is embedded** within the programs and market settings.
  - Strong external validity.
  - Research permit the telling of simple stories to external audiences.
  - Important to determine whether insights from behavioral science have policy-relevant impacts



# White House's Evidence and Innovation Agenda

	EXECUTIVE OFFICE OF THE PRESIDENT OFFICE OF MANAGEMENT AND BUDGET WASHINGTON, D.C. 20503
THE DIRECTOR	July 26, 2013
M-13-17	
MEMORANI	DUM TO THE HEADS OF DEPARTMENTS AND AGENCIES
FROM:	Sylvia M. Burwell Bub Director, Office of Management and Budget
	Cecilia Muñoz Colluctor Director, Domestic Policy Council
	John Holdren MAA
	Director, Office of Science and Technology Policy
	Alan Krueger An an Aussers Chairman, Council of Economic Advisers
SUBJECT:	Next Steps in the Evidence and Innovation Agenda

• "... strengthening agencies' abilities to continually improve program performance by applying existing evidence about what works, generating new knowledge, and using experimentation and innovation to test new approaches to program delivery. ... This is especially important given current fiscal challenges, as our nation recovers from a deep recession and agencies face tough choices about how to meet increased demand for services in a constrained resource environment." (Memorandum to the head of departments and agencies, 2013)



## Bipartisan Support for Evidence-based Policy

- Evidence-Based Policymaking Commission Act
  - Sponsored by Speaker Paul Ryan (R-WI) and Senator Patty Murray (D-WA)
  - Signed into law by President Obama on March 30, 2016
  - Final Report released on September 6, 2017.
- The Trump administration released executive directives by the in 2017 calling for evidence-based policy.
- On January 15, 2019, Trump signed the "Foundations for Evidence-Based Policymaking Act of 2018".



# Foundations for Evidence-Based Policymaking Act of 2018

### Key provisions:

- **Directs Agencies to Develop Evidence Plans**. Enables agencies to better prioritize evidence building by requiring that agencies document their key research questions, data needs, and planned activities.
- **Prioritizes Evaluation Activities in Agencies.** Improves agency capacity to engage in and use program evaluation by establishing evaluation officers in government agencies and requiring agencies to develop written evaluation policies
- Develops Baseline Information about the Resources Available for Evidence Building. Directs government agencies to periodically assess and report on their capabilities to engage in statistical, evaluation, and policy analysis activities and use the corresponding evidence for day-to-day government operations
- Makes Administrative Records Available for Evidence Building. Under a set of confidentiality protections, encourages that government data can and should be used to generate evidence about policies and programs, unless otherwise restricted by law



# **CBEAR Goals**

Bring insights from the behavioral sciences to agrienvironmental programs





Foster a culture of experimentation & evidence in agri-environmental programs

CBEAR a USDA Center of Excellence in 2016, 2019.



# Active research testing various nudges

- **Negative/Positive framing** of information
- Focusing on an **identifiable victim** of environmental pollution
- Importance of **public signaling** of behavior
- The Influence of the **voting process** on individual decisions
- Anchoring/defaults
- Emphasize the public environmental goods of actions
- Goal setting
- CREAR The Center for Privatoral & Experimental
- Time and risk preferences

- Use of **mascots** to encourage social norms
- Test the influence of **testimonials**
- Influence of fixed payments versus lotteries
- Conservation activities through personal contact versus emails
- Test importance of reminder messages
- Evaluate whether **social comparisons**
- **Persistence** of conservation practices after payments cease.





## Location of CBEAR projects by county in the United States







# Successes

- Engaged in more than 25 research projects that involve adult participants in nearly every state in the country;
- Leveraged ERS's initial investment of \$750,000 into additional grants that contributed more than \$6 million of additional research funds;
- Hosted events such as including workshops, conferences, and lunch-andlearns, to connect academic researchers and program managers;
- Developed the CBEAR Behavioral Insights Brief to explain topics and tools in behavioral sciences that can be applied to agri-environmental issues;
- Contracted by USDA Natural Resources Conservation Service's (NRCS) to develop and deliver staff training modules that provide information about useful insights from behavioral economics and how to use experiments to generate evidence to increase the effectiveness of NRCS programs and











## Success Stories: Process Labeling of Food

- 2015 CAST Paper Issue paper on Process Labeling of Food.
- Understanding consumer behavior in response to process labels.
- Impacted the federal legislation on labeling of foods with GMO ingredients.



Process labels can effectively bridge the informational gap between producers and consumers, but such labeling often has serious unintentional consequences. (Background image from Joshua Rainey Photography/Shutterstock; Foreground image from Matthew Cole/Shutterstock (Ladepted.)

#### ABSTRACT

The simple phrase "You are what you eat" is commonly taught to children and then repeated throughout one's life. This phrase speaks to the intimate connection between individuals' food choices and their health and even their personal identity. Yet most modern consumers rarely grow their own food, which means that what people "are" is a bit out of their control. Given today's predominantly global food supply chain, consumers have little ability to observe directly the production process that created the food they eat. count Consumers are frequently Und exposed to labels communicating production, such as Certified Organic, Rainforest Alliance Certified, tbST free, Fair Trade, and Free of Genetically Modified Organisms. At the root of this phenomenon are the desires for individual control and a diffuse distrust in the safety and health of the food produced by modern agriculture. These desires are paired with concerns about

the ethical, social, and environmental consequences of food production. Under appropriate third-party or governmental oversight, these "process labels" can effectively bridge the informational gap between producers and consumers, satisfy consumer demand for broader and more stringent quality assurance criteria, and ultimately create value for both consumers and producers. Despite these potential benefits, process labeling often has serious unintentional consequences. For instance, labeling the benefits of a process for a



Any opinions, findings, conclusions, or recommendations expressed in this publication are those of the author(s) and do not necessarily reflect the views of CAST.

# Concerns about Applying Results from Lab Experiments To Policy





"Behavioral and experimental economics agri-environmental research: methodological issues, literature gaps, and recommendations"

L. Palm-Forster, P. Ferraro, N. Janusch, C. Vossler, and K. Messer Environmental and Resource Economics (Special Issue - Forthcoming)



# Publication Bias

ADDRESSING PARTICIPANT INATTENTION IN FEDERAL PROGRAMS: A FIELD EXPERIMENT WITH THE CONSERVATION RESERVE PROGRAM

STEVEN WALLANDER, PAUL FERRARO, AND NATHANIEL HIGGINS

N = 46,823 (producers with expiring CRP contracts)

AJAE editor comments

• "Reviewer 3 finds the small/no impacts of the treatment to reduce the contribution of this paper."

 "Reviewer 1 and 2 would also like to see more exploration of the types of farms and regions where the treatment had a bigger impact."



## **Publication Bias**

OBHDP editor comments:

 "It is important to publish these findings since null results are badly underreported. The experiment seems well conducted, however to fit with OBHDP it would need to shed more light on underlying mechanism of why these interventions did not have an effect on these organizations."





# Under-Powered Studies, Replicability, and Preregistrations

The Economic Journal, 127 (October), F236–F265. Doi: 10.1111/ecoj.12461 © 2017 Royal Economic Society. Published by John Wiley & Sons, 9600 Garsington Road, Oxford OX4 2DQ, UK and 350 Main Street, Malden, MA 02148, USA.

#### THE POWER OF BIAS IN ECONOMICS RESEARCH\*

John P. A. Ioannidis, T. D. Stanley and Hristos Doucouliagos

We investigate two critical dimensions of the credibility of empirical economics research: statistical power and bias. We survey 159 empirical economics literatures that draw upon 64,076 estimates of economic parameters reported in more than 6,700 empirical studies. Half of the research areas have nearly 90% of their results under-powered. The median statistical power is 18%, or less. A simple weighted average of those reported results that are adequately powered (power  $\geq$  80%) reveals that nearly 80% of the reported effects in these empirical economics literatures are exaggerated; typically, by a factor of two and with one-third inflated by a factor of four or more.



# Example: Loss-framed Incentive Contracts

ISS Pilot

Ferraro and Tracy

Stated Effort Lab Hannan et al. Brooks et al.

- 16 published experiments imply that loss-framed contracts, on average, increase effort (success) at the incentivized task
- Meta-analysis yields an overall weighted average effect of 0.31 SD [95%CI 0.18, 0.44]

#### Study Real Effort Field Armantier and Boly Hossain and List Team Hossain and List Indiv Levitt et al. Financial Levitt Non-Financial De Quidt Random effects model Real Effort Lab Church et al. Goldsmith and Dhar Dolan et al. AB Lab Brooks et al. Imas et al.





1.5



(Source: Ferraro and Tracy, unpublished)

# Loss-framed Incentive Contracts





# Loss-framed Incentive Contracts





Standardised Mean Difference





# The Value of Replicability

- Replicability was supposed to be a fundamental tenant of experimental economics, but it doesn't happen very often.
  - Hard to get funding for this.
- Value in pre-registering experimental designs, including pre-analysis plans (PAPs) (<u>http://www.socialscienceregistry.org/</u>).



# The Appeal of Framed Field Experiments for Policy







## CBEAR Sandbox: AgVISE, AgDRIP, HomeVISE

# AgVISE (traps for feral hogs)

## Screening Criteria:

- Typically earn \$1,000 or more in ag revenue annually
- Own or lease land in TX, LA, MS, TN, AL, GA, SC, or FL
- 25+ years of age
- One member per household per auction







From: Weigel, Masters, Ferraro, and Messer

# AgVISE (Agricultural Value, Innovation, and Stewardship Enhancement) project





https://www.youtube.com/watch?v=BJbl1qs75BI

# Initial Results (Cost-effectiveness of Nudges)





# Research Examples:

# Randomized Controlled Trials embedded in USDA Program



# Histosol Outreach Project





Lamm, J. Larson, K. Messer, B. Thomas, and M. Wilson

# USDA wants to persuade farmers to <u>mitigate</u> climate change

Farm Press Staff | Southeast Farm Press

May 12, 2016

COMMENTS 0

### Memail in Share

the Center for

Behavioral & Experimental

Agri-Environmental Research

 Agriculture Secretary Tom Vilsack shared May 12 the first results of USDA's Building Blocks for Climate Smart Agriculture and Forestry, one year after the plan was unveiled at Michigan State University.









In order to get farmers to use adaptive farming practices like low tillage or crop rotations, Arbuckle r<u>ecommended that extension workers avoid</u> <u>talking specifically about greenhouse gas mitigation or even use the</u> <u>phrase "climate change" at all.</u>





# Histosol Outreach Experiment

- Early internal discussion immediately bogged down:
  - Do not use "G" or "C" words
  - Invite everyone to webinar
  - Mail only vs "personal contact"
- Simple ("light touch") outreach intervention
  - Mail contact (10,000 landowners)
  - Information: website and webinar
  - Outcomes: website hits and links, webinar attendance, Receipt of Service, NPAD



# **Outreach** Letters

{Customer Name} {Address} {City} {State}{Zip}

4 March 2016

Dear {Customer Name}:

Why am I getting this letter?

Organic ("muck") soils are some of the most productive soils in the world. They have high nutrient content and water holding capacity. But they are **extremely fragile**. As a producer who may have significant organic soil acreage on your

farm, you likely are aware of the soil "subsiding" after years of cropping. This subsidence indicates that organic matter is being lost, with a resulting decrease in productivity.

This occurs because organic matter in these soils rapidly breaks down when exposed to air. These soils are also susceptible to wind erosion and compaction. The loss of organic matter makes farming these soils more difficult and expensive.

This soil breakdown also has negative environmental impacts, like affecting water quality in your county.

Farming on Organic Soils: Best practices to maintain soil health and productivity

Would you like to learn more? To get more information go to: http://smarter.farm/g

NRCS and FSA staff at your local service center can also answer your questions. For vour local contact, please visit http://offices.sc.egov.usda.gov/locator/app

We encourage you to take action to learn more about what you can do. The USDA administers a range of programs that can help you maintain or even enhance your long-term productivity, while promoting soil health and improving water quality.



For example, the Environmental Quality Incentive Program covers much of the cost of adopting conservation practices like no-till, cover crops, pasture conversion, or installation of wind breaks. Converting to managed or permanently flooded wetlands can stop and possibly reverse subsidence. If you have lands that are unprofitable to cultivate, you can instead restore their soil functions using the Conservation Reserve Program or Agricultural Conservation Easement Program, which **compensate you** for forgone agricultural returns, as well as establishment costs.

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contribute to climate change. Compared to other soils in the U.S., organic soils release the most greenhouse gases per acre when they are disturbed. Applying lime to reduce their acidity increases their greenhouse gas emissions.

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# Reminder postcards



CREAR The Center for Becaptriced & Experimental Agert Reinforcemental Research

# "The USDA will host a webinar to answer your questions and provide more information ..."



### Mentioning Climate Change and Greenhouse Gas Emissions has No Effect on Responses





Inviting Farmer to Webinar Reduced the Website Hits or Outbound Links Per Invitation by Almost Half









# Challenge of Representativeness



- As one moves away from student subjects, this inherently suggests that the composition of the sample matters. Thus, one needs to draw as representative sample as possible.
- New approaches are needed to deal with a public that is increasingly wary of participating in studies.
- Keys of recruitment:
  - Trust
  - Ease of participation





# Challenge of Representativeness

- HomeVISE (Homeowner Value, Innovation, and Stewardships Enhancement) project
  - Source: T. Li, J. Fooks, K. Messer, P. Ferraro (in review)
- Spring of 2015, we worked with Infogroup, a company that promised to send invitations to our field experiment.
- We paid \$650 for them to solicit 5000 residents of Delaware.
  - Only 14 people participated (0.28%).
  - None were from Delaware.
- We revised it to be an intercept study to be conducted at Ag Day.
  - In one day, we had 337 adults participate!
  - Subsequent HomeVISE studies had approximately 2000 more adult participants













The Center fo

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# Partnerships can be Challenging

AgVISE (Agricultural Value, Innovation, and Stewardship Enhancement) project





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# Challenge of Shifting Partner Priorities and Staff Turnover





# Challenge of Shifting Partner Priorities



- Example, in 2015, NRCS launched a new internet platform, "Conservation Client Gateway" in the hopes of better serving its customers.
  - Set ambitious goal of enrolling 60,000 landowners in first year
- NRCS started working with CBEAR and ERS on how to improve the roll-out.
  - Rejected all major ideas; only wanting to consider the lightest of interventions.
- Project launch delayed several times and before the actual launch we were called and told that due to concerns about low enrollment that they weren't going to be working with CBEAR.
  - Irony is this is <u>exactly</u> when trying something new would have been most appropriate.



- How did it turn out?
  - Only 300 farmers enrolled in first year. Enrollment now is reportedly around 6,000 farmers.
  - Sadly, no lessons were learned to help avoid problems in future.

# Lessons learned

- 1. Develop a coalition/network (aka. *share the wealth*)
- 2. Be non-partisan
- 3. Seek opportunities for collaborative/cooperative research, especially if administrative data is accessible
- 4. Relationships matter and timing is key
  - Example of NRCS Conservation Communication Contract.
  - Very hard when agencies are experience staff turnovers.
- 5. Need more research on recruiting a representative sample of farmers/landowners to participate in incentivized experiments
- 6. Need to have careful design with pre-analysis plans and power analysis.



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