Some people are:

(i) boundedly rational

(ii) living w/ unstable preferences

(iii) probability weighters and loss-averse

(iv) time inconsistent

(v) other-regarding or norm conforming

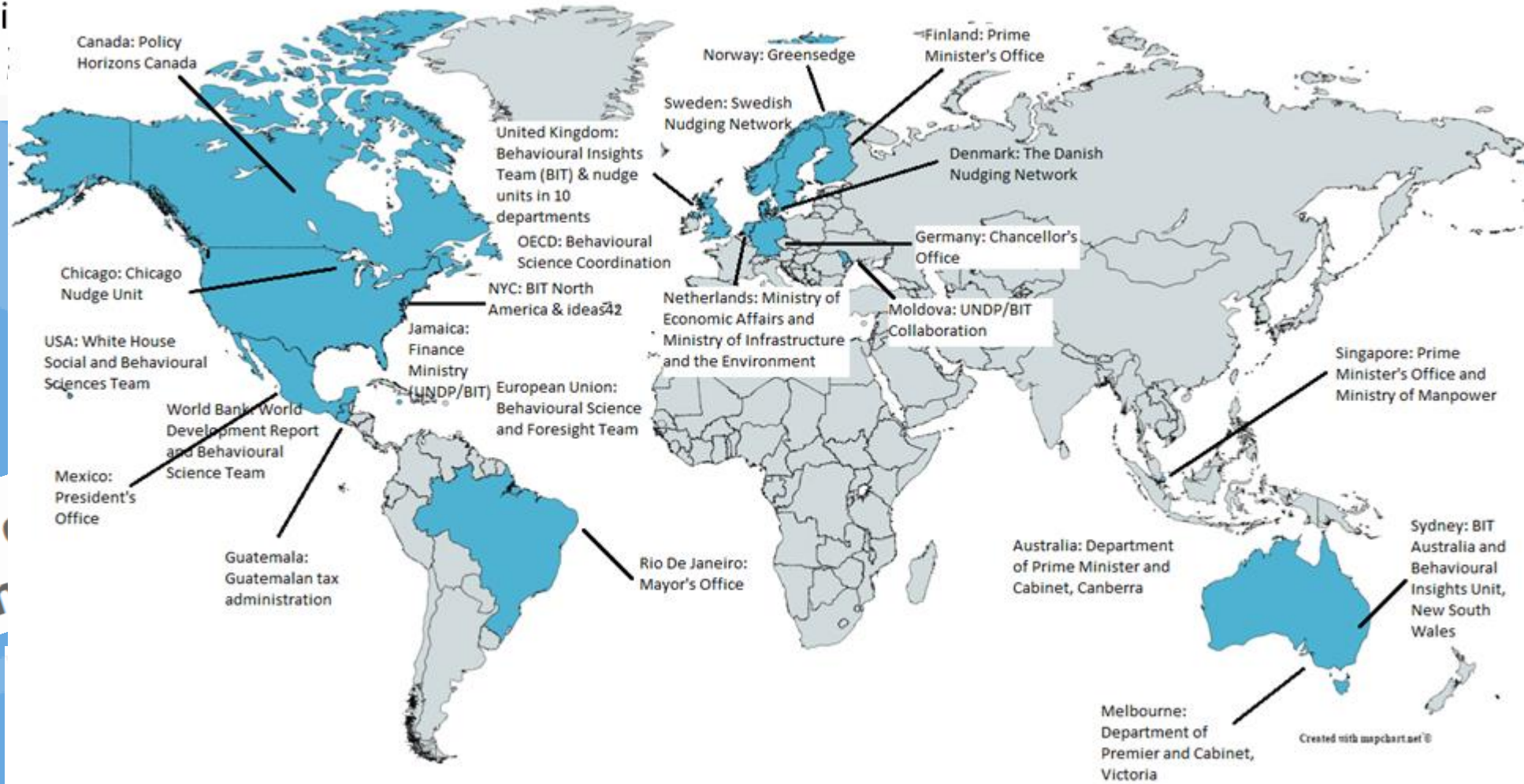|	
Messenger	We are heavily influenced by who communicates information
Incentives	Our responses to incentives are shaped by predictable mental shortcuts such as strongly avoiding losses
Norms	We are strongly influences by what others do
Defaults	We 'go with the flow' of pre-set options
Salience	Our attention is drawn to what is novel and might seem relevant to us
Priming	Our acts are often influenced by sub-conscious cues
Affect	Our emotional associations can powerfully shape our actions
Commitment	We seek to be consistent with our public promises and reciprocate acts
Ego	We act in ways that make us feel better about ourselves

Behavioral Economics & Policy: The Knowns

Traditional economic solutions to social problems: property rights and prices → "Get incentives right"

Behavioral economics identifies obstacles to traditional solutions or opens up paths to alternative solutions. Alternative solutions are:

- Sometimes less expensive or more politically acceptable or desirable.
- Often easier to randomize and thus easier to develop a more credible empirical evidence base about effectiveness.

NUDGE UNITS AROUND THE WORLD

BEHAVIOURAL
EXCHANGE
Sydney 20

International Behavioural

Behavi

Making a

Canada: Policy Horizons Canada

Norway: Greensedge

Finland: Prime Minister's Office

Sweden: Swedish Nudging Network

Denmark: The Danish Nudging Network

United Kingdom: Behavioural Insights Team (BIT) & nudge units in 10 departments

OECD: Behavioural Science Coordination

Germany: Chancellor's Office

Chicago: Chicago Nudge Unit

NYC: BIT North America & ideas42

Netherlands: Ministry of Economic Affairs and Ministry of Infrastructure and the Environment

Moldova: UNDP/BIT Collaboration

USA: White House Social and Behavioural Sciences Team

Jamaica: Finance Ministry (UNDP/BIT)

European Union: Behavioural Science and Foresight Team

Singapore: Prime Minister's Office and Ministry of Manpower

World Bank: World Development Report and Behavioural Science Team

Mexico: President's Office

Guatemala: Guatemalan tax administration

Rio De Janeiro: Mayor's Office

Australia: Department of Prime Minister and Cabinet, Canberra

Sydney: BIT Australia and Behavioural Insights Unit, New South Wales

Melbourne: Department of Premier and Cabinet, Victoria

Created with mapchart.net ©

Source: Behavioural Insights Team, UK.

Nudge nudge, think think

Jac Depczyk

CBEAR and EPIC Goals

Bring insights from the behavioral sciences to environmental programs

Create a culture of experimentation in environmental programs

Behavioral Economics & Policy

Behavioral economics is just economics that recognizes potential weaknesses with the standard approach to environmental solutions and observes opportunities for alternative solutions.

Loss Aversion

Kahneman in *Thinking Fast and Slow*: "[We respond] more strongly to losses than to gains. This is called loss aversion. Most studies show that losses are twice as powerful as gains on our psyche."

Study: >2.5 million professional golf putts. Golfers were much more successful when putting for par than for birdie, controlling for difficulty of the shot.

Implication: Harder for the golfers to accept losing a stroke (by missing a par putt) than it is to gain a stroke (by making a birdie).

Incentives: how they are presented matters

Can perform up to 50 action units (e.g., hectares assigned to riparian buffers).

- Gain-Frame Contract: Start with $0. "For every action you perform, you receive $100, up to $5000."

- Loss-Frame Contract: Start with $5000. "For every action you do not perform, you lose $100."

If losses are weighed more heavily than equivalent gains by many people (est. 1.5-2X), then Loss-Frame Contract could induce greater total effort.

Loss-framed Incentive Contracts

Overall Effect Size
0.28 SD
[95%CI 0.11, 0.45]

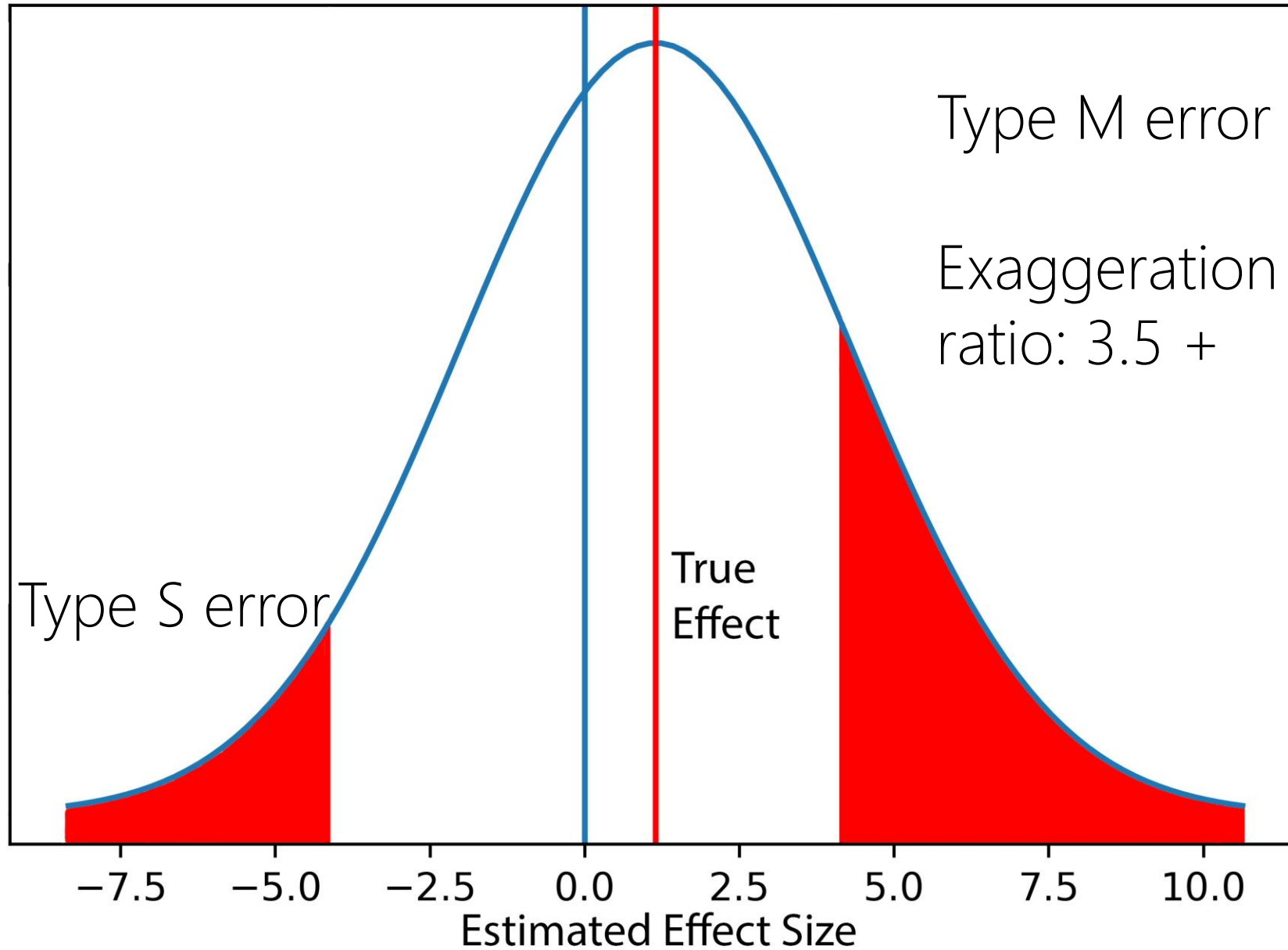Ferraro and Tracy, unpublished
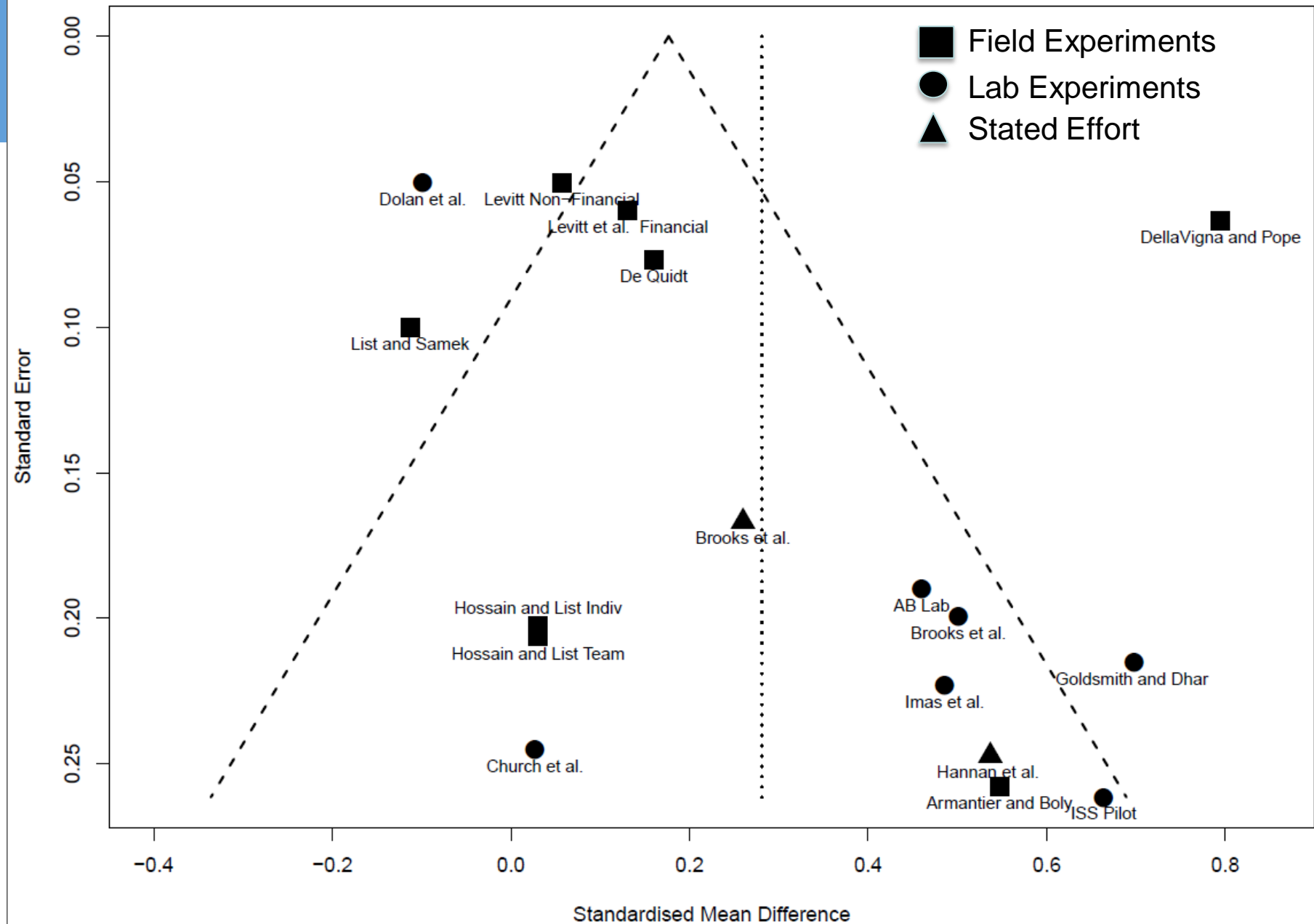
Why aren't loss-framed contracts widespread?

- Organizations don't know.

- Treatment effects from experiments are exaggerated or do not generalize to field settings.

Lab effect sizes are larger, on average, than field effect sizes

Ferraro and Tracy, unpublished

Effect of anchor on WTP

Power = 0.16

Type M error

Exaggeration ratio: 3.5 +

Type S error

True Effect
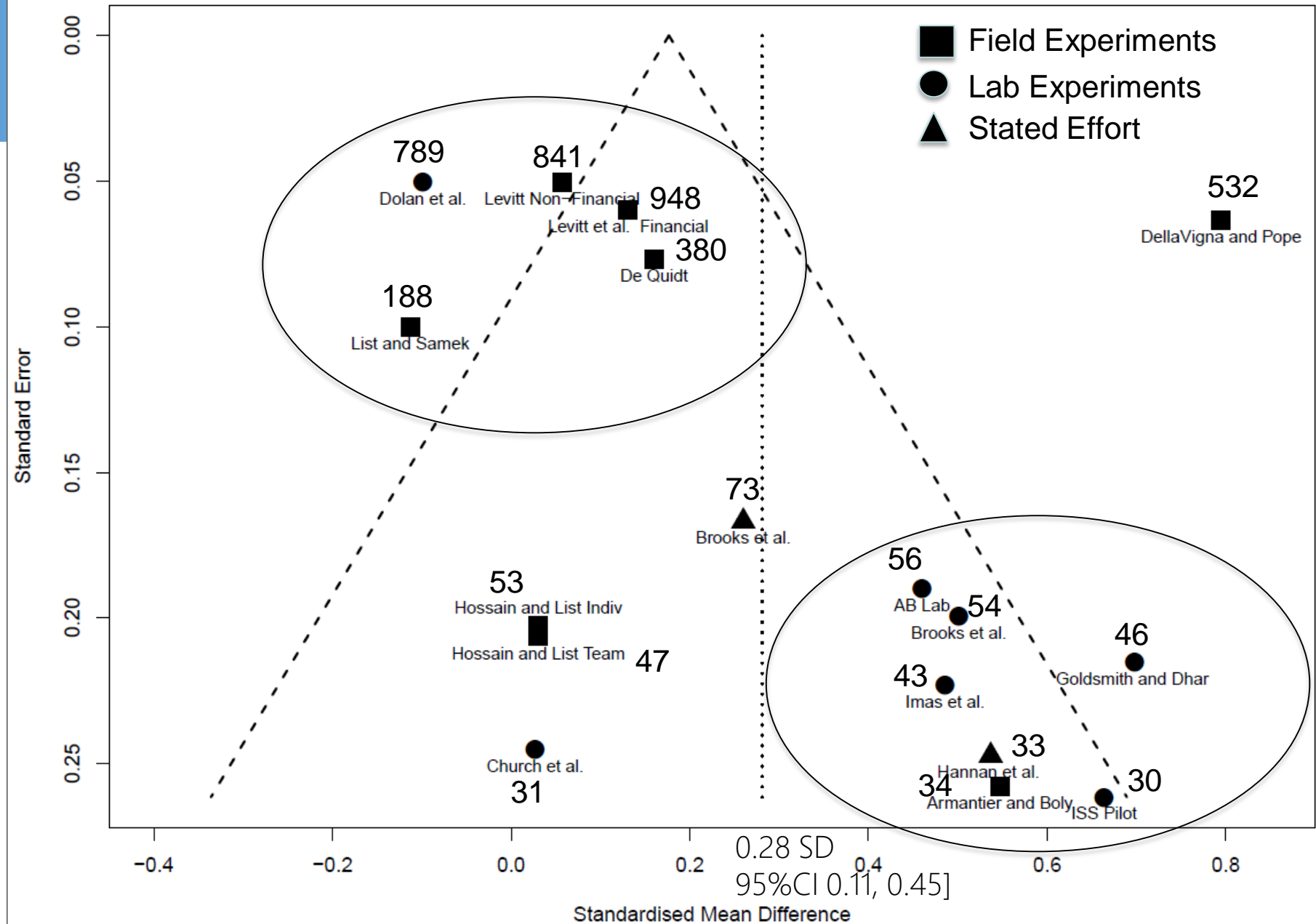
THE POWER OF BIAS IN ECONOMICS RESEARCH*

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 ≥ 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.

Results imply that people's preferences are characterized by a very large degree of arbitrariness. In particular, they provide evidence that subjects' preferences for an array of goods and hedonic experiences are strongly affected by normatively irrelevant cues, namely anchors.

50-200% changes in WTP and WTA as anchor changes
Primary study on WTP for private goods uses N=55 subjects

Addressing Participant Inattention in Federal Programs: A Field Experiment with the Conservation Reserve Program

Steven Wallander, P   2017
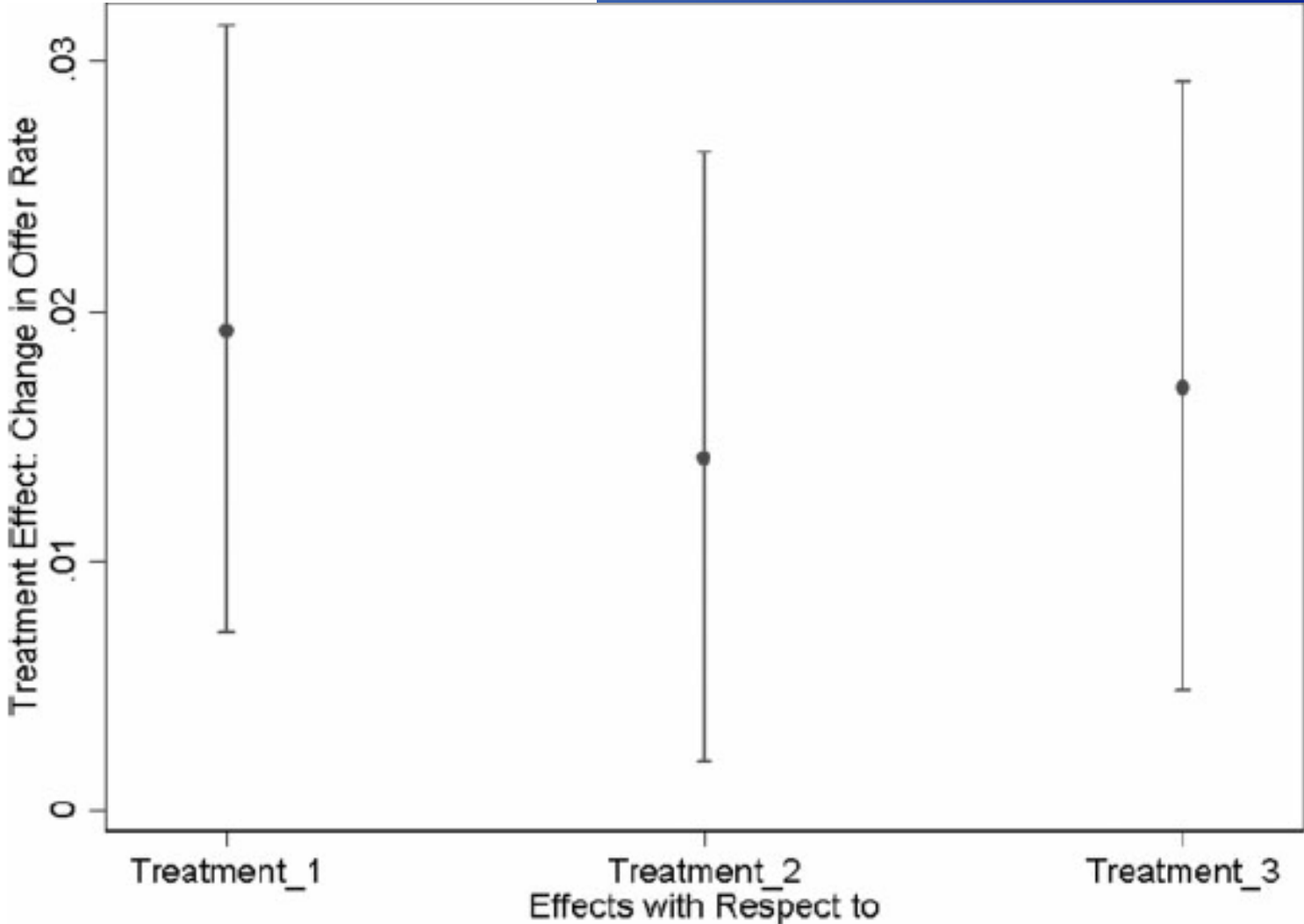
N= 46,823
(producers
with expiring
CRP contracts)

Figure 3. Treatment effect estimates for population of farms with expiring contracts

"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."

Nudging organizations: evidence from two large-scale field experiments

The estimated average treatment effect (ATE) of combined treatment is a 2% <u>decrease</u> in contributions (95% CI [-27%, 24%]).

Estimated Treatment Effect (OLS Regression Estimator)	**-$1.34** **95% CI [-18.67, 15.99]** **p = 0.88**

The estimated ATE from publicly acknowledging contributions is a 5% <u>decrease</u> in contributions (95% CI [-13%, 3%]).

Estimated Treatment Effect (OLS Regression Estimator)	**-$10.35** **95% CI [-26.91, 6.20]** **p = 0.22**

Fan, Ferraro, Messer, & Weigel, unpublished
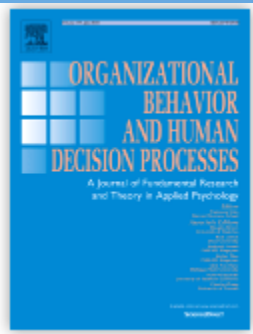
"The experiment seems well conducted, however to fit with OBHDP

it would need to shed more light on underlying mechanism of why

these interventions not have an effect on these organizations."

Trim & Fill Correction

Revised Effect Size: 0.11

95%CI [-0.07, 0.29]

Ferraro and Tracy, unpublished
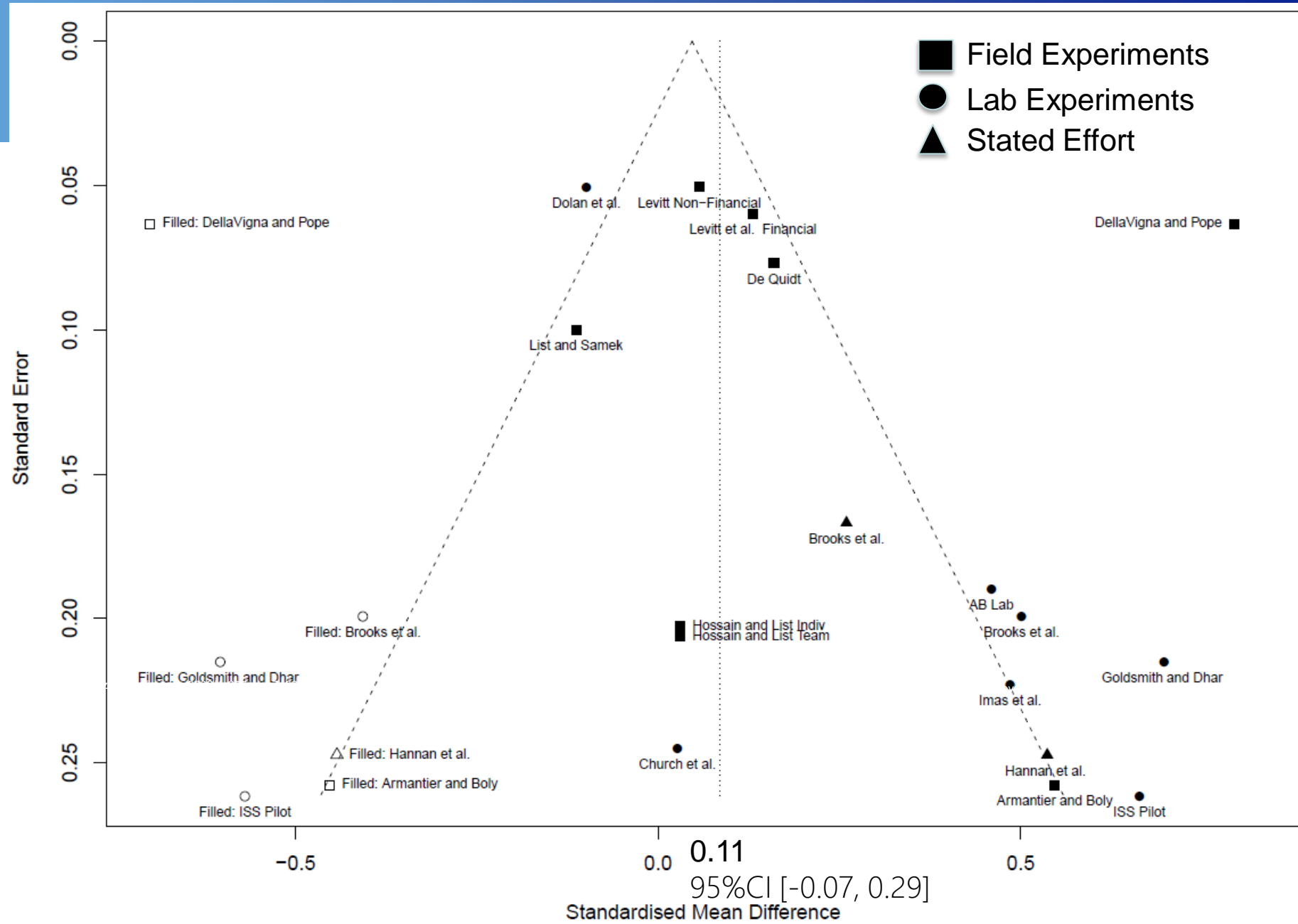
Curb your enthusiasm

Of 13,000 RCTs conducted by Google and Microsoft to evaluate new products or strategies in recent years, 80-90 percent have reportedly found no statistically significant effects (Arnold Foundation report, 2018)

We should not expect large treatment effects

P. Rossi. *The Iron Law of Evaluation and Other Metallic Rules* (1987)

The Iron Law of Evaluation: The expected value of any net impact assessment of any large scale social program is zero.

The Stainless Steel Law of Evaluation: The better designed the impact evaluation of a social program, the more likely is the resulting estimate of net impact to be zero.

Why aren't loss-framed contracts widespread?

- Organizations don't know.

- Treatment effects from experiments are exaggerated or do not generalize to field settings.

- Treatment effects may wane over time. Almost all of the studies examined behavior over a single day. The maximum time period was weekly incentive payments over a four-week period.

I'll have the salad.

• Just suggesting students take a fruit will increase the number of them eating it by as much as 70%.

• Closing the lid on an ice cream freezer can reduce the number of people choosing ice cream from 14% to 30%.

• Introducing a salad bar increased school lunch participation by 21% in a high school of 1,000 students.
 (http://www.ben.cornell.edu/)
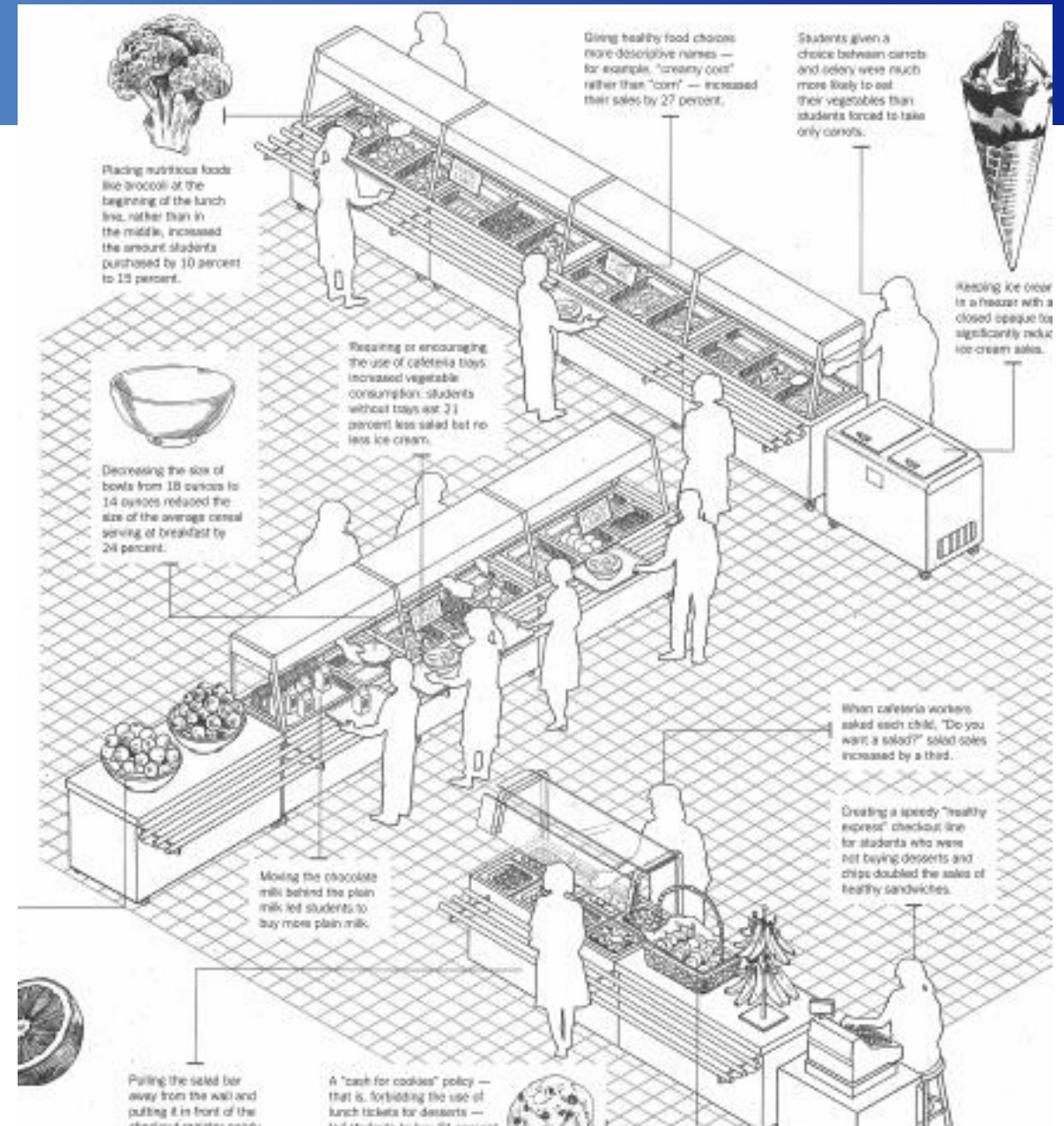
I'll have the salad.

Persistence of Impacts?

Systematic review of
lunch program
behavioral
interventions
said one study
(Wansink et al. 2012)
had found "sustained"
impact, but study was
for only two months.
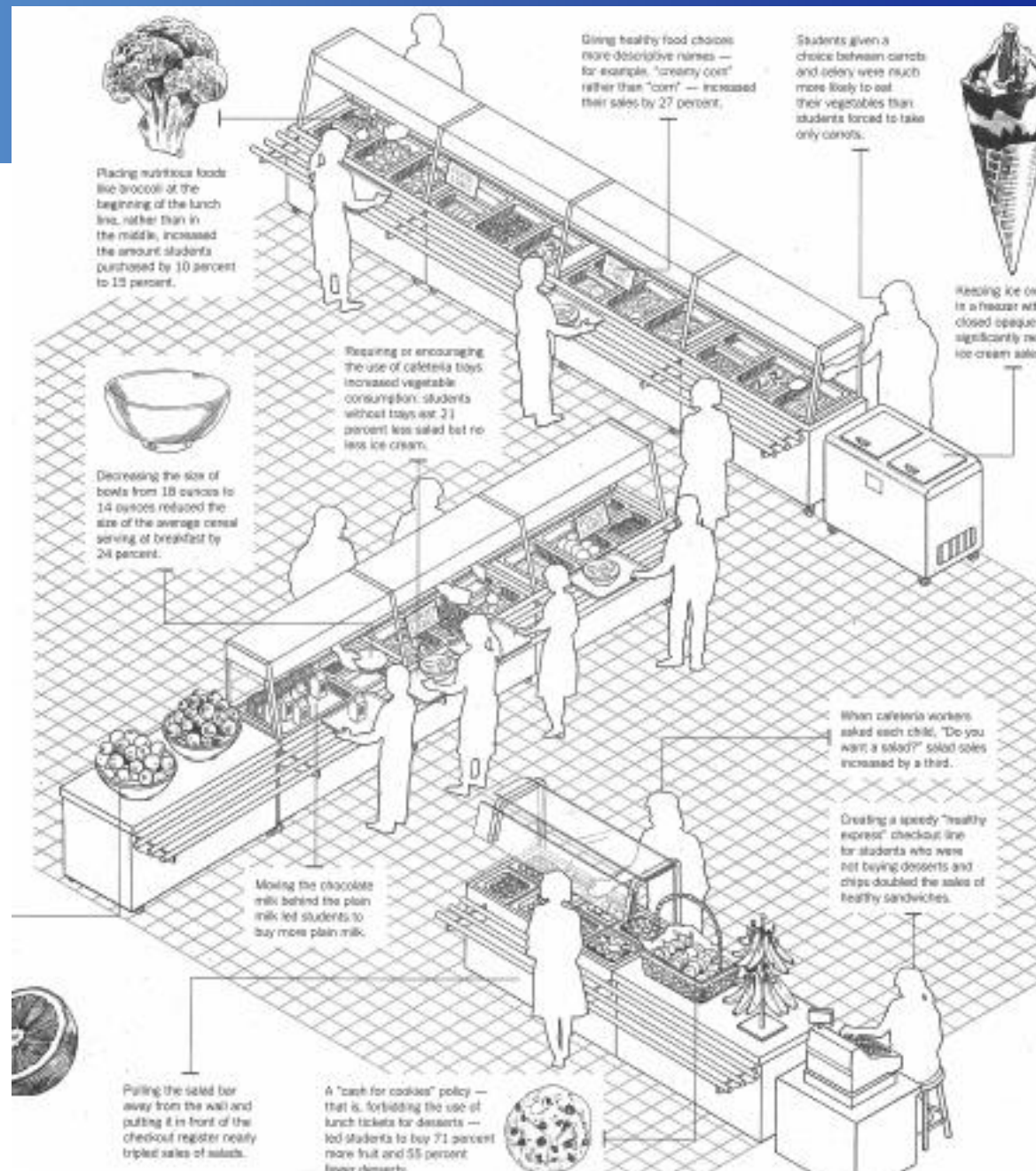
Treatment 2
Technical Advice+ Moral Suasion

Dear Members of the ⬛ Residence,

As you may know, Cobb County's water resources are stretched because of population growth and many years of low rainfall. Cobb County residents consume almost one out of every ten gallons of Georgia's public water supply. As a result, our water use has a large impact on the ability of Georgia's waterways to protect wildlife and dilute pollutants that threaten human health. **We all need to work together to use water wisely**.

We need your help. **Act on the tips listed in the enclosed tip sheet**. We all have to do our part to protect Cobb County's precious water resources. Reducing our water consumption today is important for preserving our environment and our economy for future generations. **Please don't waste water**. Remember: every drop counts!

Ferraro and Price, 2013, *ReStat*

Treatment 3
Tip Sheet + Suasion + Social Comparison

Your own total consumption June to October 2006:   52,000 gallons

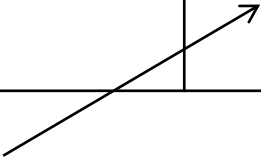*Your neighbors' average (median) consumption June to October 2006:   35,000 gallons*

You consumed more water than 73% of your Cobb County neighbors.

Ferraro and Price, 2013, *ReStat*

	Summer '07
Treat 1 (Info only)	**-0.7%**
Treat 2 (Info + Injunctive Norm)	**-2.7%**
Treat 3 (Treat 2 + Compar-ison)	**-4.8%**

Ferraro and Price, 2013

	Summer '07	Summer '08	Summer '09	Summer '10	Summer '11	Summer '12	Summer '13
Treat 1 (Info)	-0.7%	~0%	~0%	~0%	~0%	~0%	~0%
Treat 2 (Weak)	-2.7%	~0%	~0%	~0%	~0%	~0%	~0%
Treat 3 (Strong)	-4.8%	-2.5%	-1.3%	-1.7%	-1.3%	-0.2%	-0.9%

-1.43% (no move)

Ferraro & Price 2013; Ferraro et al. 2011; Bernedo et al. 2015

Neighbor Efficiency Rank

Your energy efficiency rank out of 100 neighbors:

More Efficient

Your Rank

82 — 80 — 69 — 64 — 52 — 41

Less Efficient

JUL   AUG   SEPT   OCT   NOV   DEC

Your rank dates correspond to your billing periods.
Your neighbors are nearby, occupied, similar-sized homes.
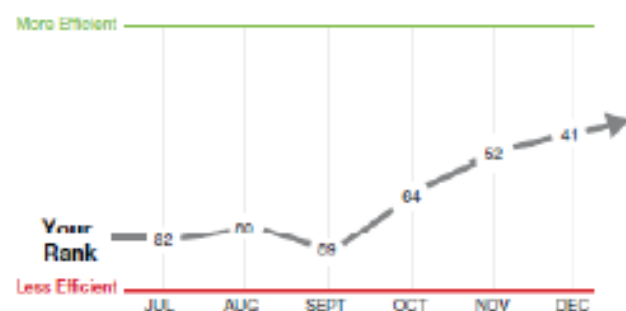
Your Rank Last Month

#41 out of 100 neighbors
#1 is the most efficient

★ Good work, your rank is improving!
Find more tips and ways to save:
www.UtilityCo.com/reports

Understanding Energy Use

Heating is the largest use of energy for a typical household in the East Metro area, accounting for more than 50% of total energy use. To maximize your savings, focus on the biggest users first.

Typical annual energy use in the East Metro area

Cooling 3%
Refrigerators 4%
Lighting 5%
Other 15%
Water Heating 15%
Heating 58%
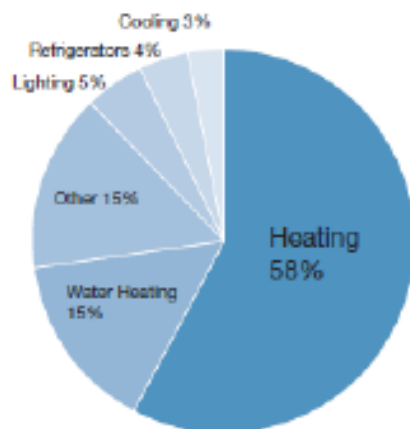
Other appliances and electronics include dishwashers, washing machines, dryers, computers, TVs and entertainment systems.
Based on a typical household with gas heating & water heating.
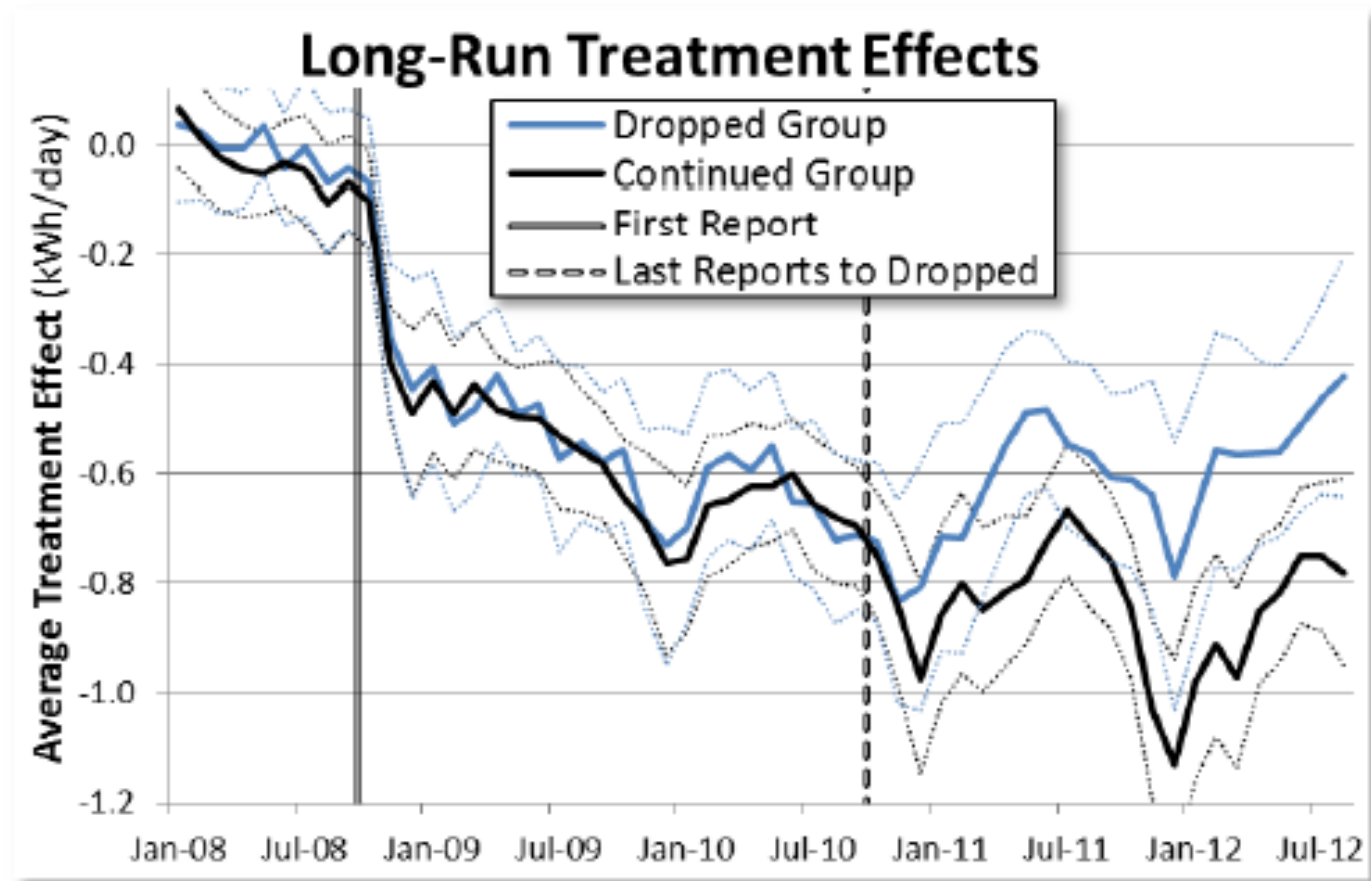
Top Tips For Saving	Save up to
☐ **Look for the ENERGY STAR® label** Next Steps: Look for the ENERGY STAR label when shopping for appliances and electronics.	$600/yr
☐ **Improve insulation and seal air leaks** Next Steps: Start with the places easiest to access, such as an attic.	$305/yr
☐ **Seal leaky ducts** Next Steps: Use mastic (a special adhesive) or duct tape to seal all accessible duct joints.	$170/yr
☐ **Recycle your second refrigerator** Next Steps: Try rearranging your main fridge to fit everything from your second fridge.	$145/yr
☐ **Turn off computer at night** Next Steps: Program your computer to automatically turn off after periods of inactivity.	$75/yr
☐ **Set your thermostat wisely** Next Steps: Set your thermostat 10 degrees off from your preferred setting when you're away or sleeping.	$85/yr
☐ **Install efficient showerheads** Next Steps: Get a new efficient showerhead and bathroom faucet aerator for free! Visit xcelenergy.com/energyreport for details.	$45/yr

Already do these tips?
Find more ways to save online

For energy-saving tips visit
www.UtilityCo.com/reports

Long-Run Treatment Effects

Legend:
- Dropped Group
- Continued Group
- First Report
- Last Reports to Dropped

Y-axis: Average Treatment Effect (kWh/day), ranging from 0.0 to -1.2

X-axis: Jan-08, Jul-08, Jan-09, Jul-09, Jan-10, Jul-10, Jan-11, Jul-11, Jan-12, Jul-12

Notes: This figure plots the ATEs for each month of the sample for the continued and dropped groups, estimated by Equation (6). The dotted lines reflect 90 percent confidence intervals, with robust standard errors clustered by household.

Allcott and Rogers, 2014

Why aren't loss-framed contracts widespread?

- Organizations don't know.

- Treatment effects from experiments are exaggerated or do not generalize.

- Treatment effects may wane over time.

- Mechanisms through which the treatment effect arises are unclear. People may experience disutility from the loss-framing and when given a choice between isomorphic incentive contracts, choose gain-frame over loss-frame versions.

Trim & Fill Correction

When given the choice between contract frames, only 1 in 5 workers chose the loss-frame contract

Ferraro and Tracy, unpublished
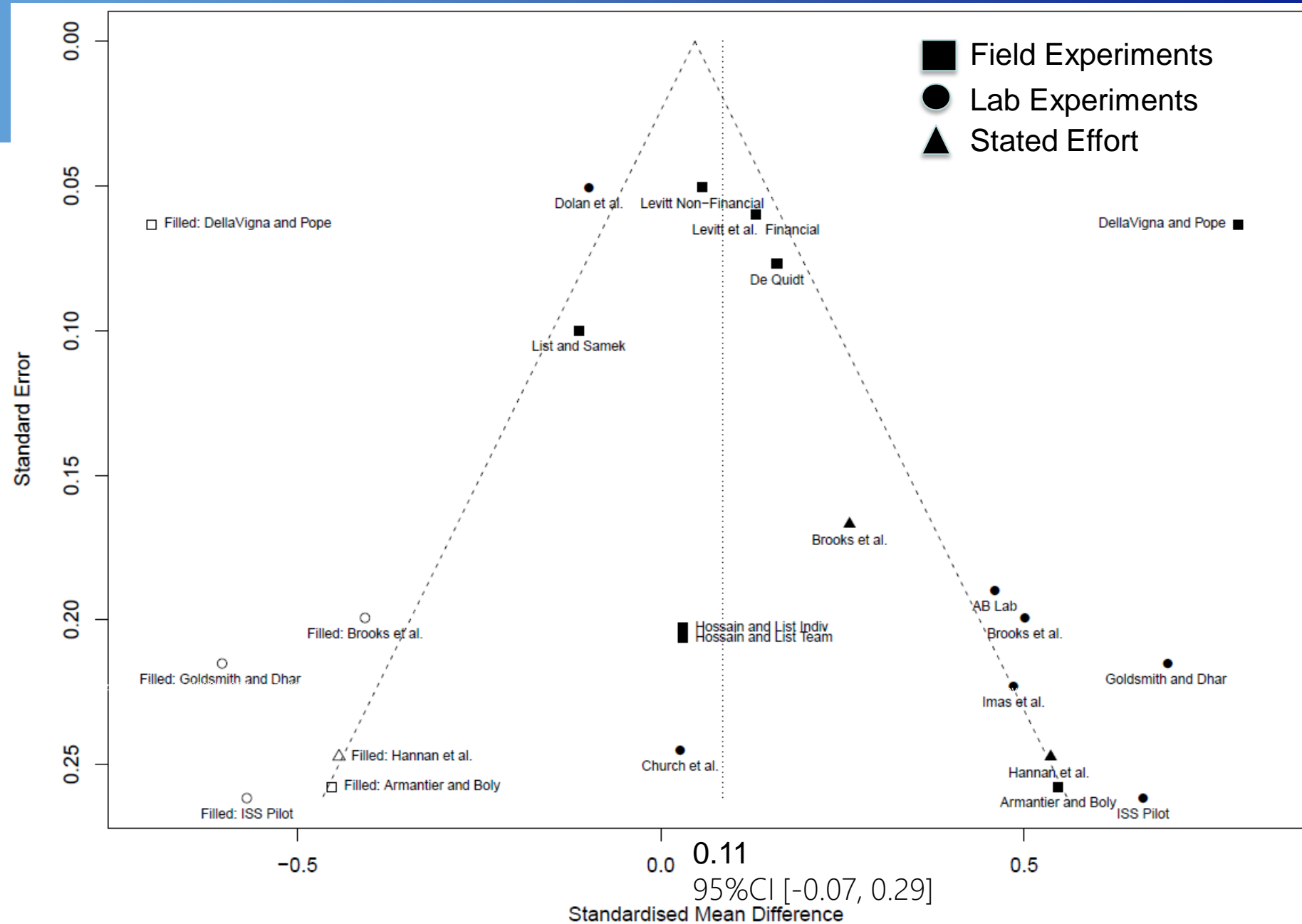
Mechanisms Matter

- Matter for human welfare impacts. Are we providing information that people desire? Are we using negative emotions, like shame or guilt, that people wish to avoid?

- Matter for environmental impacts (e.g., outdoor versus indoor water use)

- Matter for designing programs in new contexts.

- Matter for learning to make programs more effective.

Mechanisms

Yevgenia Nayberg

"The best way to start a more sustainable lifestyle is to begin with recycling; anyone can easily start. "

"Drive a fuel-efficient car? I already recycle!"

What happens when people know about the behavioral economics-based intervention?

Two studies made subjects aware of intent of intervention, but were hypothetical choices (Loewenstein et al., 2014)(Gunnlaugsson, 2014) and a third told subjects the intent and then only exposed willing subjects to the treatment (Kurz et al., 2005).
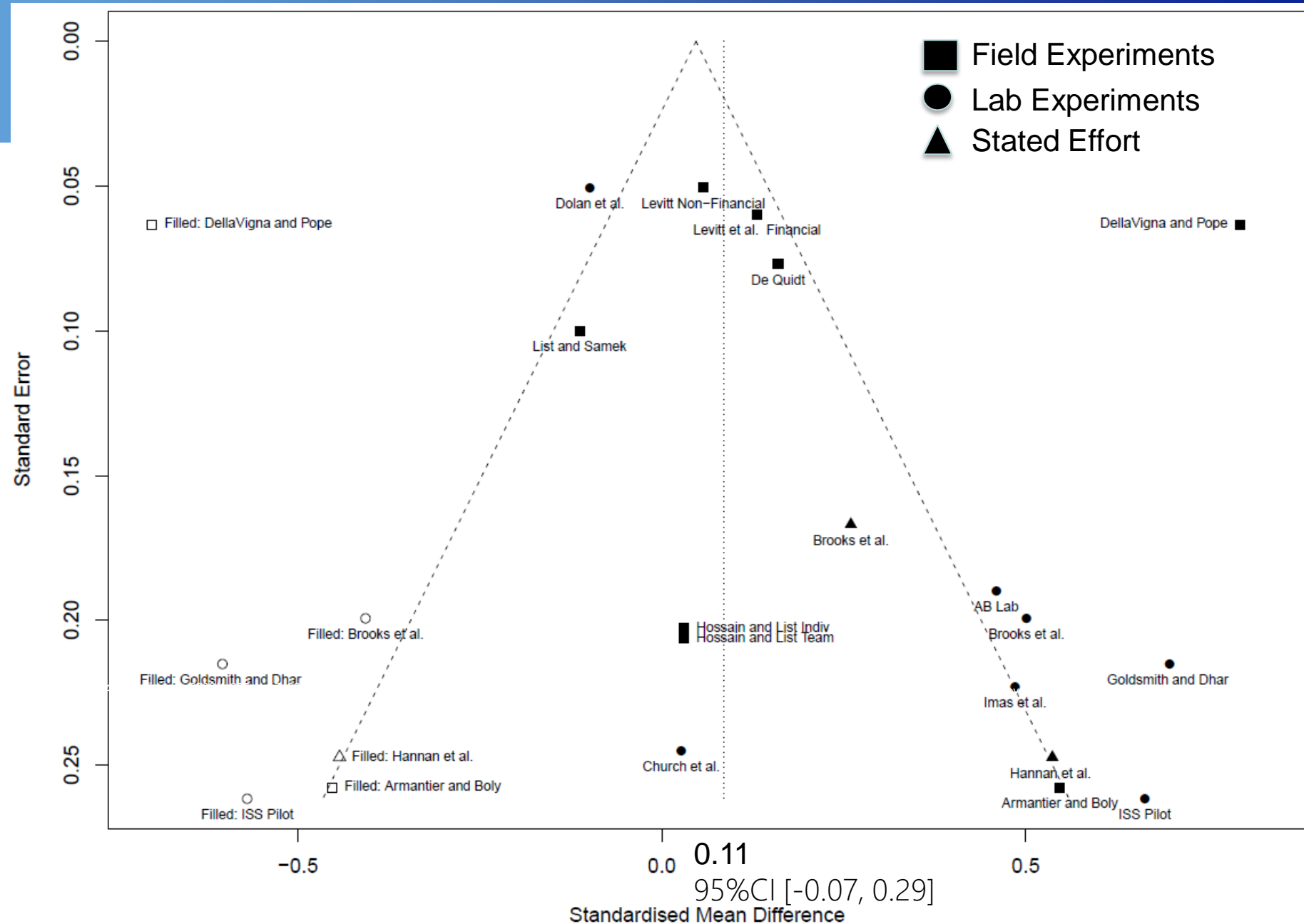
Trim & Fill Correction

When given the choice between contract frames, only 1 in 5 workers chose the loss-frame contract

When workers are aware of both contract frames and the loss-frame effect, the treatment effect disappears

Ferraro and Tracy, unpublished

Field Experiments
Lab Experiments
Stated Effort

Dolan et al.   Levitt Non-Financial
Filled: DellaVigna and Pope
Levitt et al. Financial
DellaVigna and Pope
De Quidt
List and Samek
Brooks et al.
Filled: Brooks et al.
Hossain and List Indiv
Hossain and List Team
AB Lab
Brooks et al.
Filled: Goldsmith and Dhar
Imas et al.
Goldsmith and Dhar
Filled: Hannan et al.
Filled: Armantier and Boly
Church et al.
Hannan et al.
Filled: ISS Pilot
Armantier and Boly
ISS Pilot

Standard Error

0.11
95%CI [−0.07, 0.29]
Standardised Mean Difference

Producers and behavioral economics

Farmers, fishermen and polluting facilities may be better characterized as producers.

Two potentially important changes:

(1) objective function; and

(2) the decision making process: decisions often done by groups, delegated authorities, or within a bureaucracy in which decisions are made sequentially by multiple actors.

Producers?

An open question is whether behavioral economics-inspired interventions also affect agents who are better characterized as profit-maximizers in competitive environments with good knowledge of the decision environment.

So how does my facility compare with other facilities in Kansas?

Based on these facility averages, we are able to generate a distribution of all facilities' average compliance ratios. We graphically present this distribution in the enclosed figure. Each facility is represented once in this distribution. At the bottom of the distribution is the facility with the smallest compliance ratio – it is found at the extreme left of the graph where the curve begins (minimum ratio = 0.04). At the top of the distribution is the facility with the largest compliance ratio – it is found at the extreme right of the graph where the curve ends (maximum ratio = 1.92). In the middle of the distribution is the median compliance ratio (0.44) – half of the facilities have compliance ratios above this value and half have compliance ratios below this value.

> **Have questions or want to provide us with feedback?**
>
> You are most welcome to call Professor Earnhart at 785-864-9119 or email him at earnhart@ku.edu.
>
> *If you are not the NPDES contact person for your municipal facility, we request that you deliver our letter to the correct NPDES contact person.*

Extent of Compliance with Discharge Limits
Distribution of Kansas Municipal Facilities

13% of all Kansas municipal facilities comply to a greater extent than your facility

Your Facility's 2016 Compliance Ratio (lower is better): **0.13**

Your facility's percentile: **13th percentile** (see star on the graph)

In other words, **13%** of Kansas municipal facilities comply with their discharge limits to a greater extent than your facility complies with your limits**.**

Earnhart and Ferraro, unpublished
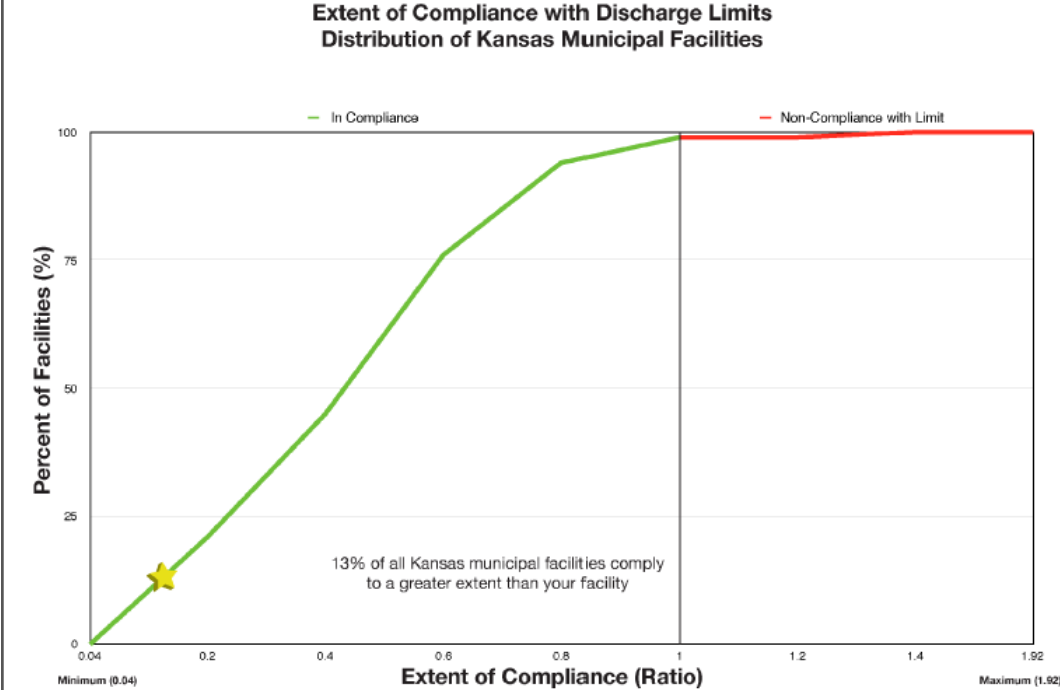
Addressing Participant Inattention in Federal Programs: A Field Experiment with the Conservation Reserve Program

Steven Wallander, P

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

Treat 1 = Reminder
Treat 2 = Reminder + Stewardship
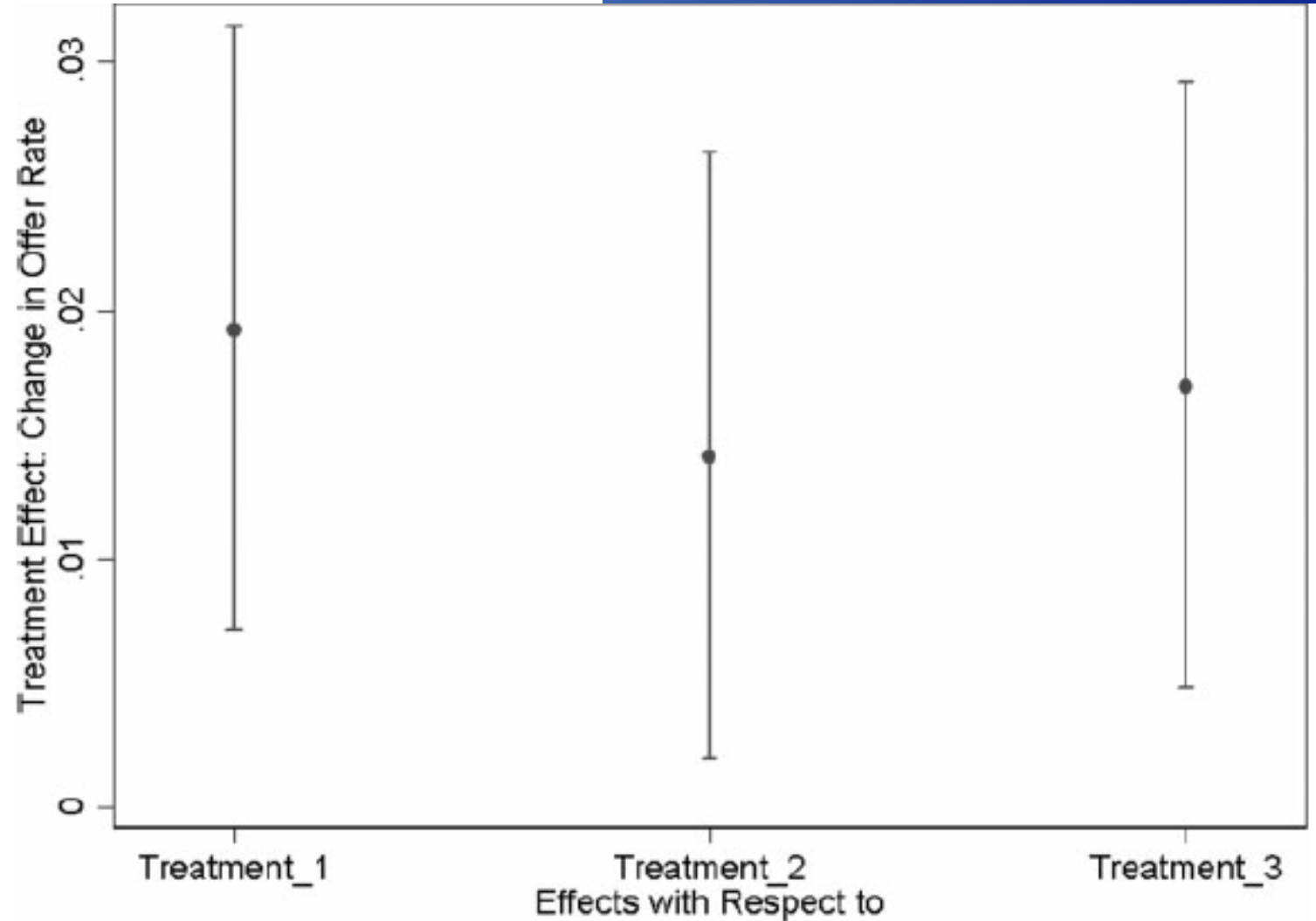Treat 3 = Reminder + Stewardship + Social Comparison

Figure 3. Treatment effect estimates for population of farms with expiring contracts

AgVISE (Agricultural Values, Innovation, and Stewardship Enhancement)
Default Starting Bid in Auction

Farm operators bidding on cost-share conservation contracts (e.g., riparian buffers, remove abandoned poultry houses, feral hog trapping systems – i.e., impure public goods)
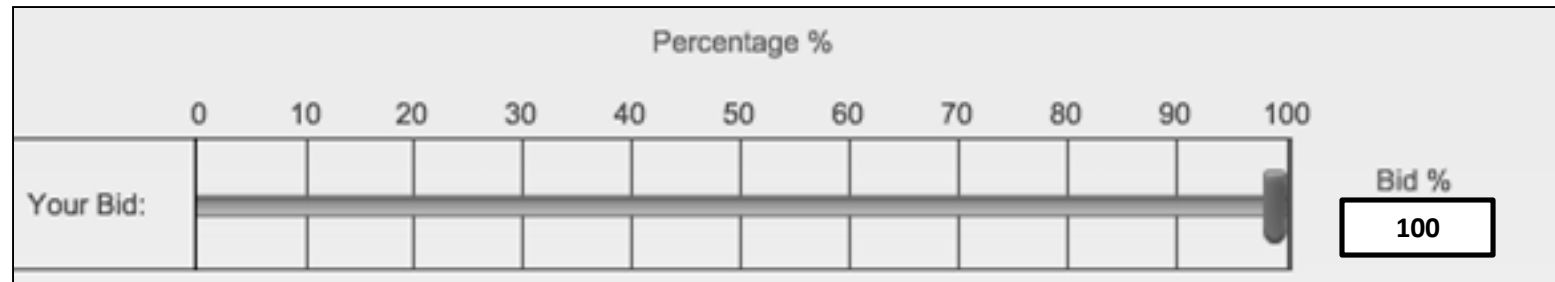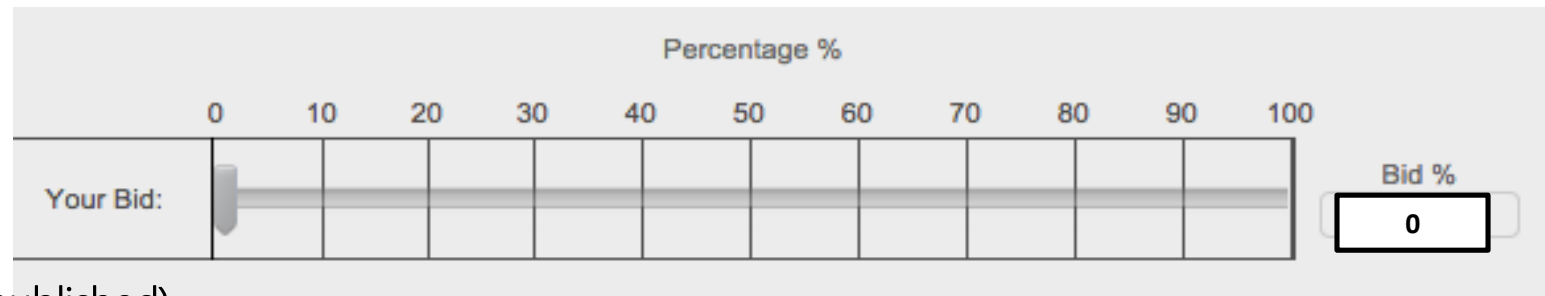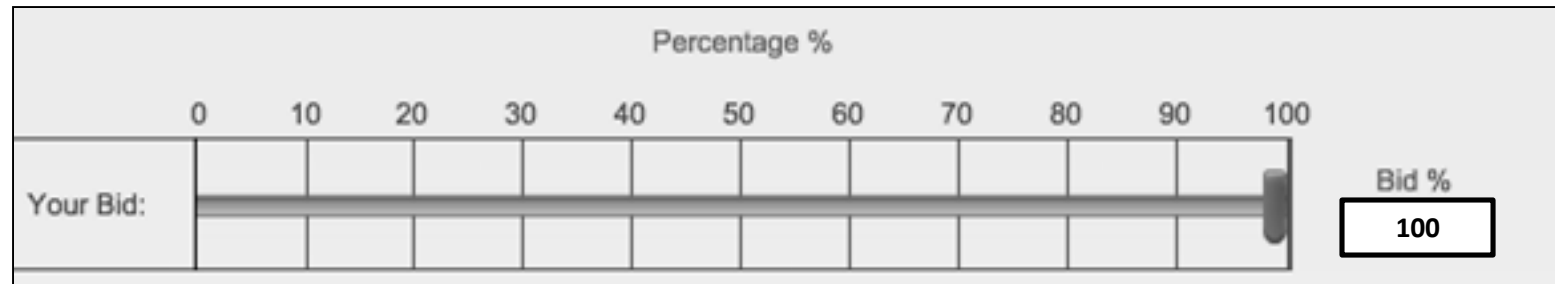

Percentage %

0   10   20   30   40   50   60   70   80   90   100

Your Bid:

Bid %
100

(Ferraro and Messer, unpublished)

AgVISE (Agricultural Values, Innovation, and Stewardship Enhancement)
Default Starting Bid in Auction

<u>Bids 10 percentage points higher</u> if assigned 100% starting bid. Equivalent to forgoing ~USD 1400

Out of 537 total participants, 178 participants placed bids.

(Ferraro and Messer, unpublished)

Applying Behavioral Economics: The Unknowns

- Underpowered Designs and Uncommon Replications
  - Field vs Lab
  - Lack of power & publication bias: Exaggerated Effect Sizes (Type M) errors
  - Lack of replications: "The truth wears off"
  - Ferraro's Law of 0.10 SD: experiments should be powered, at the very least, to detect treatment effects of this size. Take additional efforts to reduce p-hacking, multiple comparisons and other features of behavioral research that retard rather than advance the science.
- Persistence of behavioral change poorly understood
- Mechanisms poorly understood.
- Evidence mainly from consumers, often with infrequently made decisions. Not much from producers or experienced agents.

Applying Behavioral Economics: The Unknowns

- Few studies contrast traditional economics ("unbounded rationality") interventions with behavioral economics-inspired interventions in same context

- Few studies mix traditional and behavioral economics-inspired interventions.

- Few studies mix behavioral economics-inspired interventions – unclear how they interact.

Applying Behavioral Economics: The Knowns

- A credible and growing evidence base that interventions inspired by behavioral economics can change policy-relevant behaviors.

- Often inexpensive implementation, which implies that even if their behavioral impacts are small, they can be cost-effective.

- Often no new legislation or rules needed. More feasible politically.

- Often easy to pilot in inexpensive randomized controlled trials, which makes it much easier to evaluate effectiveness and thus build a solid evidence base regarding what works and under what conditions.
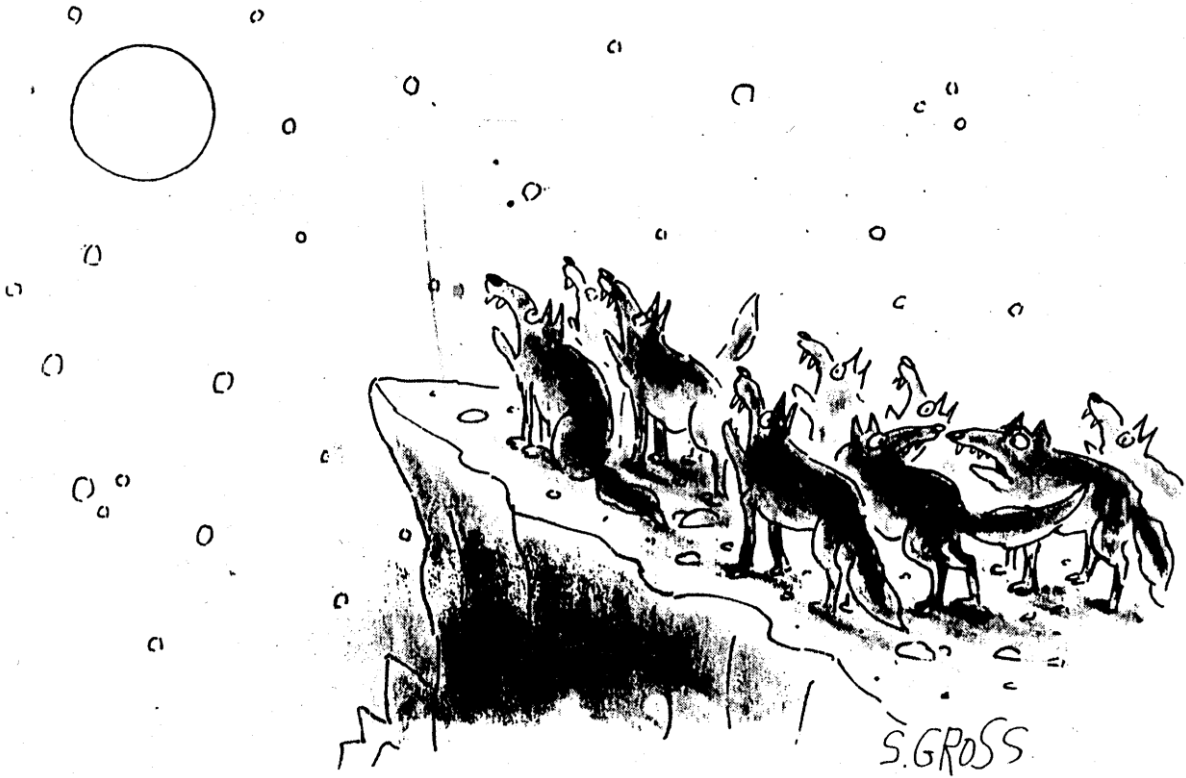
CBEAR and EPIC Goals

Bring insights from the behavioral sciences to environmental programs

Create a culture of experimentation in environmental programs

Questions?

"*My question is: Are we making an impact?*"