

# Putting Behavioral Economics to Work: Using Field Experiments to Manage Residential Water Use

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# Motivating Problem

- Use tools of experimental economics to uncover what drives residential water demand
- Provide an apples-to-apples comparison of commonly employed strategies to manage residential use
  - Uncover channels through which mechanisms influence behavior to inform theory and design of new policies
  - Avoid policies or actions that are ineffective or promote unintended consequences
- Provide guidance for policymakers and practitioners

# Experiment #1 – Compliance and Temporal Patterns of Use

- Restrictions that limit number of days a week household can water lawns
- Enforcement of regulations is problematic
  - Infrequent water patrols
  - Nominal fines for repeated violations in same calendar year

# Experiment #1 – Compliance and Temporal Patterns of Use

- Daily monitoring project of 4,800 residential water consumers over eight week period in summer 2007
  - Readings are taken overnight from households with smart meter technology
- Households randomly assigned to either a control group or one of three treatment conditions
  - Schedule reminder
  - Drought letter with pro-social appeal
  - Monitoring letter highlighting unusual patterns of use in the area

# Experiment #1 – Compliance and Temporal Patterns of Use

- Treatment letters mailed during fourth week of project
  - Identification of treatment effects based on difference-in-differences approach
  - Compare change in use after intervention across treatment and control group
- Subset of households are monitored following summer to examine persistence

# Experiment #1 – Compliance and Temporal Patterns of Use

- Treatment generate approximately 6.5 to 15.2% reductions in rates of non-compliance in post-intervention period
- Significant reductions in use on unassigned days (6.4 – 11.9%) in post-intervention period amongst treated HHs
- Use on assigned days in post-intervention period
  - Significant increase in use on assigned days amongst HHs in schedule and monitoring treatments
  - Significant reductions in use on assigned days amongst HHs receiving normative appeal

# Experiment #2 – Promoting Conservation Efforts

- Cobb County Water System
  - Second largest user of public water supplies in state
  - Distributes treated surface water to approximately 170,000 customers
- Partnered with CCWS to implement norm-based conservation campaign in summer 2007 (drought)
  - Information campaigns highlighting how and why to conserve water
  - Apples-to-apples comparison of appeal to civic duty and social comparisons

# Experiment #2 – Promoting Conservation Efforts

- Messages focusing on why to conserve more effective than those stating how to conserve
  - No significant reduction in use amongst HHs in technical advice treatment
  - HHs in social comparison treatment consume approximately 4.8 percent less than those in the control group
- Impacts are heterogeneous and more pronounced amongst highest user groups



# Experiment #2 – Promoting Conservation Efforts

- Examine persistence of effects by looking at use through summer 2013
- Social comparisons have lasting impact on water consumption
  - Consume 2.6 percent less than counterparts in control during summer 2008
  - Consume 1-1.5 percent less than counterparts in control in all remaining years
- Unable to detect long-run effect for normative appeal

# Experiment #3 – Promoting Changes in Landscape

- Partnered with a public utility in Southwest to examine program that subsidizes purchase of drought-resistant plants
- More than 23,000 households randomized into either control group or one of three treatment conditions
  - Normative appeal comparing use to average household in the area
  - Frame rebate from a loss domain – do not lose your chance to....
  - Cross the normative appeal and loss framing

# Experiment #3 – Promoting Changes in Landscape

- Normative appeals have no impact on enrollment decision
  - Effective strategy to manage demand – everyone is marginal consumer....
  - Smaller set of consumers on margin when it comes to enrollment decision
- Framing the subsidy from the loss domain has significant impact on enrollment
  - Approximate 35% increase in the number of households enrolled

# Major Lessons Learned

- Both neo-classical and behavioral motives are important drivers of behavior
  - Norms matter
  - Frames matter
  - Prices matter....
- Important complementarities between motives and policies

# Major Lessons Learned

- Impacts of behavioral interventions are more pronounced in short-run and tend to wane over time
  - Out of sight, out of mind
  - Boy who cried wolf
- Significant heterogeneity in the effects of such strategies across observable dimensions

## Some Take Away Thoughts....

- No one size fits all policy to promote demand management
  - Drivers of behavior are heterogeneous
  - Impacts differ across households and over time
  - Policies work along different margins and impact different “types” of people
- Partnerships between public utilities and academics have proven highly successful
  - Informed policy and helped achieve desired outcomes