

# Field Experiments and Policy Evaluation

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## What is a Field Experiment?

- Providing insights on causation rather than simple patterns of correlation is major challenge for policy evaluation
- Field experiments build upon experimental model from physical sciences
  - Overlay carefully crafted, exogenous variations into real world environments
  - Randomization provides an instrument that allows researcher to uncover causal relationships and isolate drivers of observed behavior

## Why Use Field Experiments?

- Provide a bridge between laboratory and naturally occurring data
  - Mixture of control not achieved with observational data and realism that is difficult to achieve in laboratory
- Central advantage of field experiments
  - Ability to examine behavior in naturally occurring settings with self-selected agents
  - Isolate the effects of factors such as market experience or familiarity with underlying institution

## Why Use Field Experiments?

- Provide apples-to-apples comparison of different policies and uncover channels through which they influence behavior
  - Provide guidance for policymakers and practitioners
  - Avoid policies/actions that are ineffective or promote unintended consequences
- Foster deeper understanding of behaviors that generate public goods (bads)
  - Identify influences that drive such actions

## Policy Driven Field Experiments

- Truckee Meadows Water Authority – compliance with day-of-week restrictions on outdoor use
  - Explore effectiveness of messages that focus on monitoring efforts with those that focus on moral suasion
- Cobb County Water System – conservation and overall demand management
  - Explore effectiveness of pro-social appeals with social comparison

## Experiment 1: Compliance with OWRs

- Outdoor watering restrictions that allow households to water lawns on two assigned days per week
- Restrictions initially implemented in 1992 as reaction to prolonged period of drought
- Restrictions made permanent in 1996
  - Guard against droughts through sufficient water storage
  - Assure adequate flows of Truckee River to Pyramid Lake

### Experiment 1: Compliance with OWRs

- Enforcement of regulations is problematic
  - Infrequent water patrols
  - Nominal fines for repeated violations in same calendar year
- Truckee Meadow Water Authority considering change in policy to allow thrice a week watering
- Ensuring compliance with restriction takes on added import

### Experiment 1: Compliance with OWRs

- Daily monitoring project of 4,800 residential water consumers over an eight week period in summer 2007
  - Readings are taken during overnight hours from households with smart-meter technology
- Households randomly assigned to control group or one of three treatments
  - Schedule reminder
  - Drought letter with pro-social appeal
  - Monitoring letter – Unusual patterns of usage in the area

### Experiment 1: Compliance with OWRs

- Treatment letters were mailed during fourth week of project
  - Identification of treatment effects will be based on diff-in-diff approach
  - Compare change in use after intervention across treatment and control groups
- Subset of households are monitored during summer 2008 to examine persistence of treatment effects

### Experiment 1: Compliance with OWRs

- Estimate an approximate 23% likelihood of watering on unassigned day in pre-intervention period
- Treatment effects
  - No impact on compliance amongst control group
  - Schedule reminder generates 2.2 percentage point reduction in non-compliance
  - Normative appeal generates a 1.5 percentage point reduction in non-compliance
  - Monitoring letter generates a 3.5 percentage point reduction in non-compliance

### Experiment 1: Compliance with OWRs

- Average daily use on unassigned days
  - No discernible difference in use after intervention amongst control group
  - Significant decline in use after intervention – 6.4 to 11.9 percent – amongst treatment groups
- Average daily use on assigned days
  - Significant increase in use for households assigned the schedule and monitoring letter
  - Significant reduction in use after intervention - for households assigned the drought letter

### Experiment 1: Compliance with OWRs

- Some evidence that treatment effects persist
  - Reductions in use on unassigned days during summer 2008 for both drought and monitoring letters
  - Increase in use on assigned days for households assigned the monitoring letter
- Suggests treatments may have prompted “technological” change

## Experiment 2: Promoting Conservation Efforts

- Cobb County Water System (CCWS) distributes treated surface water to approximately 170,000 customers
- Second largest user of public water supplies in the state
  - Accounts for approximately 8% of statewide use
- Residential use is highly variable
  - Five percent of customers account for approximately 18 percent of overall use

## Experiment 2: Promoting Conservation Efforts

- CCWS obtains water from disputed surface supplies affected by periodic drought conditions since 1998
- Prompted initiatives to encourage conservation efforts amongst residential consumers
  - Tiered-rate pricing scheme
  - Information campaigns highlighting how and why to conserve water
- Effectiveness of different strategies largely unknown
  - Apples-to-apples comparison of appeals to social norms and social comparisons

## Experiment 2: Promoting Conservation Efforts

- Partner with Cobb County Water System to implement a norm-based conservation campaign during summer 2007
- Households randomized into four treatment cells
  - Control Group
  - Group that received technical advice
  - Group that received technical advice and norm-based appeal to conserve water
  - Group that received technical advice and norm-based appeal that included a social comparison
- Track households for three year period following intervention to examine both short- and long-run treatment effects

## Experiment 2: Promoting Conservation Efforts

- Non-pecuniary messages provide an effective means to promote short-run conservation efforts
- Technical advice alone has but a small, and insignificant, impact on water use
  - Households consume approximately 1 percent less than those in control
- Augmenting technical advice to include norm-based appeals to conserve generate substantially larger reductions
  - Households in weak social norm treatment consume approximately 2.7 percent less than those in control
  - Households in social comparison treatment consume approximately 4.8 percent less than those in control



## Experiment 2: Promoting Conservation Efforts

- Examine use during summer 2008 and summer 2009 seasons as function of initial treatment assignment
- Social comparisons have lasting impact on water consumption
  - Consume 2.6 percent less than counterparts in control during summer 2008
  - Consume 1.3 percent less than counterparts in control during summer 2009
- Unable to detect a meaningful long-run treatment effect for households in weak social norm
  - Consumption during both the 2008 and 2009 summers indistinguishable from that observed amongst households in control group

## Experiment 2: Promoting Conservation Efforts

- Results suggest important difference in potential channels through which normative appeals and social comparisons effect behavior
- Normative appeals promote little more than behavioral adjustments
  - Consonant with models of bounded attention whereby effectiveness of appeal wanes over time
- Social comparisons promote both behavioral adjustments and durable conservation efforts
  - Consonant with models of imperfect information in the spirit of Becker's (1965) household production framework
  - Information triggers household to re-evaluate consumption decisions and undertake fixed investments that have lasting impact on demand

### Take Away Thoughts....

- Partnerships between public utilities and academics have proven highly successful
  - Informed policy and helped achieve desired conservation/compliance targets
  - Furthered our understanding of household behavior and factors that drive demand
- Significant scope for continued partnerships
  - Number of unanswered questions – adoption of water saving technologies, real time pricing and information feedback, etc.