

An Experimental Evaluation of the Federal Weatherization Assistance Program

Meredith Fowlie and Catherine Wolfram

The Federal Weatherization Assistance Program

- Over the past 30 years, an estimated 6.2 million households have received weatherization assistance.
- On the campaign trail, Obama set a goal of weatherizing 1 million low-income homes each year for the next decade.
- The American Recovery and Reinvestment Act allocates almost \$5 billion to weatherization assistance (DOE funding for WAP was \$227 million in 2008).

Weatherization assistance under ARRA

- The income eligibility limit was raised from 150% to 200% of the poverty line.
- The maximum average expenditure per household was raised from \$2,500 to \$6,500.
- Previously weatherized units only ineligible if service was after September 30, 1994.
- Michigan received over \$243 M in ARRA funds for weatherization assistance.



Our primary research questions

- By how much does weatherization reduce consumption/expenditures at participating households?
- Do we find evidence of a “rebound effect”?
- Do estimated treatment effects vary systematically with observable socio-economic characteristics?
- Can we begin to quantify any additional non-energy benefits?
- Can we identify factors that make households more or less likely to participate in WAP?

Underlying identification problem

- To estimate the causal effect of weatherization assistance on energy consumption among participating households, we need credible, unbiased estimates of what energy consumption patterns *would* have been in the absence of the intervention.
- We cannot directly observe these counterfactual outcomes. Instead, we will try to construct credible, unbiased estimates.

Randomized Controlled Trials (RCTs)

- The “gold standard” for making a causal inference about an intervention’s impact on an outcome of interest.
- RCTs eliminate (or greatly mitigate) selection bias by design; the credibility of estimates is significantly improved.
- A growing literature documents practical experience with designing and implementing RCTs in a variety of contexts .

Standard RCT design

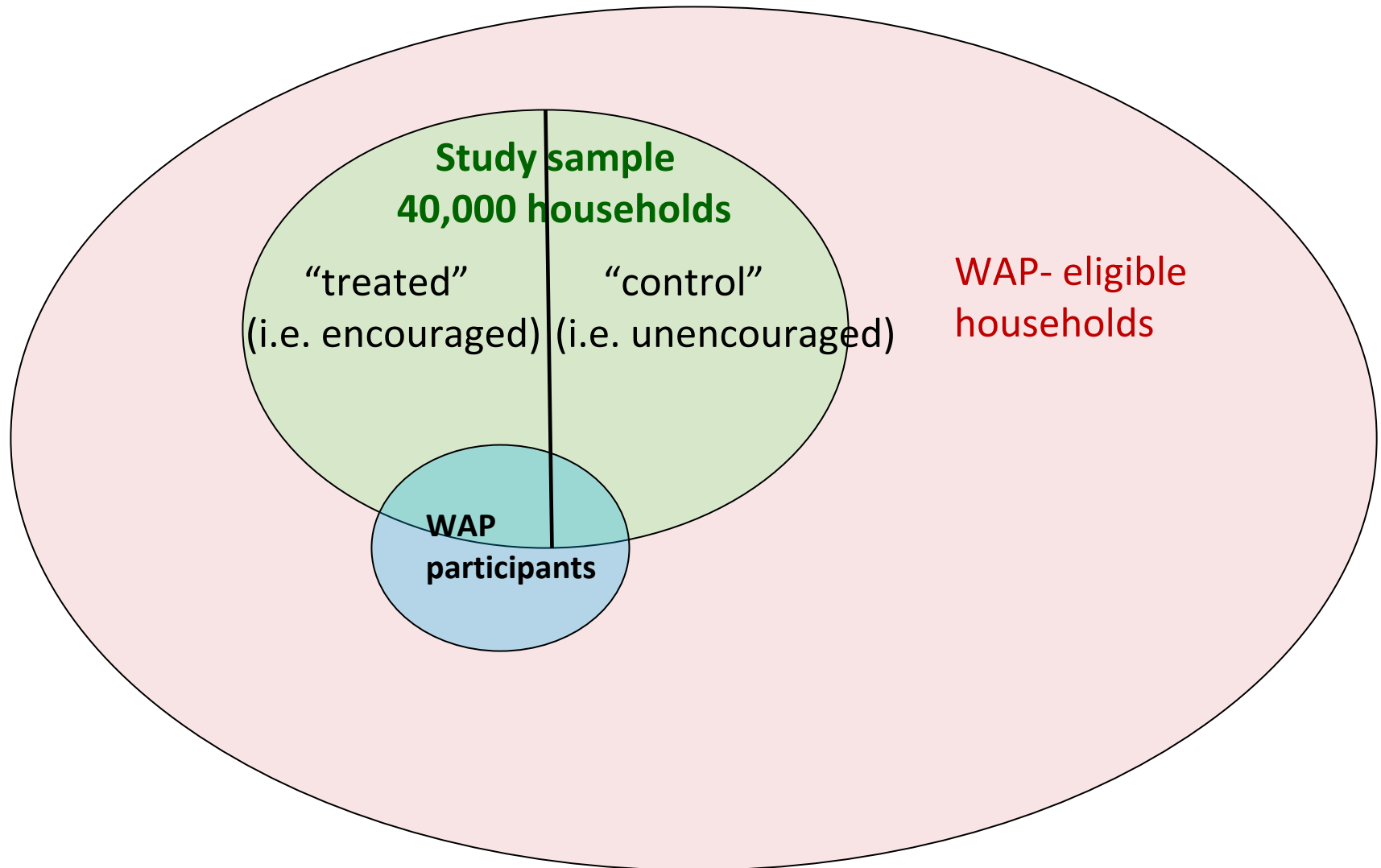
- Individuals are randomly drawn from the population of interest.
- This sample is randomly divided across intervention (*i.e.* treatment) group and a control group; two groups are identical in expectation by design.
- Post-intervention, outcomes are compared across groups to obtain estimate of the average treatment effect.
- **PROBLEM** : Mandating participation of some while preventing participation of others is impossible here.

A randomized encouragement design

REDs are particularly useful when:

- Randomization of access or mandatory participation is not practical or desirable.
 - No need to ration available services (i.e. demand does not exceed supply).
 - The effects of both participation and outreach are of policy interest.
-
- Rather than randomize over the intervention itself, we randomly manipulate encouragement to participate.

Our randomized encouragement design (in pictures)



In theory, households in our sample fall into three categories

“Never takers” : Households who will not seek out weatherization assistance, regardless of whether they receive encouragement/outreach information.

“Always takers” : Households who will learn about the program and seek out assistance with or without our encouragement.

“Compliers” : Households who we will persuade with our encouragement to participate, but who would not otherwise have received weatherization assistance.

(This assumes that our encouragement instrument has a weakly positive effect on program participation or all households)

Strengths of research design

- Plausibly exogenous variation in building efficiency, end use technologies, historical energy use (among compliers) .
- A demonstration of how randomization can be incorporated into mainstream energy policy implementation with minimal disruption.
- Potential to experiment with the design of the encouragement in order to investigate responses to different persuasion/motivation strategies.

Necessary ingredients

- Close cooperation with implementing agencies.
- Demographic data to help us identify eligible households.
- WAP data (identifying weatherized households, which interventions are installed, timing of treatment, etc).
- Household billing data (electricity and natural gas) for all 40,000 households in the study.
- An effective encouragement instrument.

Implementation time line: Cold weather region

Fall 2009	Finalize study region selection Initiate data sharing agreements with key stakeholders. Begin to identify WAP eligible households
Winter 2009/2010	Hold focus groups to inform design of encouragement instrument Identify community action agency partners
Spring/Summer 2010	Randomly select study sample households Finalize data collection/management protocols. Pilot encouragement instrument
Fall 2010	Begin roll out of encouragement instrument. Begin data set construction

Analysis of program impacts would be conducted using household-level pre-treatment data (i.e. 2007- intervention) and post-treatment data.