Watt Watchers & The Seesaw of Energy Dieting

Evidence from Low-Income Urban Households

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Motivation

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In the US:

- The federal Low Income Home Energy Assistance Program (LIHEAP):
  - Provides assistance to 9 Million of households (FY 2011); and
  - $3-5 Billion in annual funding (EEI, 2015).
  - States and local governments have their own programs, together with non-profits and utility companies.

A Research Agenda

- Why low-income households cannot afford energy bills?
  - Prices are too high
  - Information frictions
  - Behavioral issues
- Which policies (or combination of) should be used to provide bill assistance?
  - Subsidized tariffs
  - Grants and arrears forgiveness
  - Education
  - Different billing approaches, e.g., pre-paid billing

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  - Information frictions (we find evidence)
  - Behavioral issues (we find evidence)
- Which policies (or combination of) should be used to provide bill assistance?
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  - Grants and arrears forgiveness
  - Education (today's focus)
  - Different billing approaches, e.g., pre-paid meters

Research Questions

Main question:

- Can energy education alone leads to energy savings and make energy bills more affordable?

Secondary questions:

- Does the teaching format matter: in-person versus online?
- How to encourage households to attend an energy class?
- How does energy behavior change as a response to a class?

Study Design

- We implemented a **randomized encouragement design (RED)** to evaluate the impact of energy education and different teaching formats.
- A low-cost intervention with minimal change to the bill assistance process.
  - Maximized external validity
  - Kept researchers happy

Our Study Context

- Partners:
  - **Fuel Fund (FF) of Maryland**, a non-profit organization that provides energy bill assistance in the Baltimore City metropolitan region
  - **Baltimore Gas and Electric (BGE)**
- FF offers bill assistance grants and the **Watt Watchers** program: an energy education class.
- The Watt Watchers program was (before the study) a "formal" class of **2 sessions of 90 minutes**.
- The class was not mandatory prior our study and **heavily undersubscribed ($<$10%)**.

Our Target Population Lacks Affordability

Percentiles	Ratio Monthly Bill/ Monthly Income
5%	.056
10%	.072
25%	.113
50%	.182
75%	.346
90%	.560
95%	.726

Mean: .322

[8] Statistics for a subsample (N=164) of households.

Our Target Population is Not Only Energy Poor ...but also Energy Deprived

30% of our target population get disconnected prior assistance.

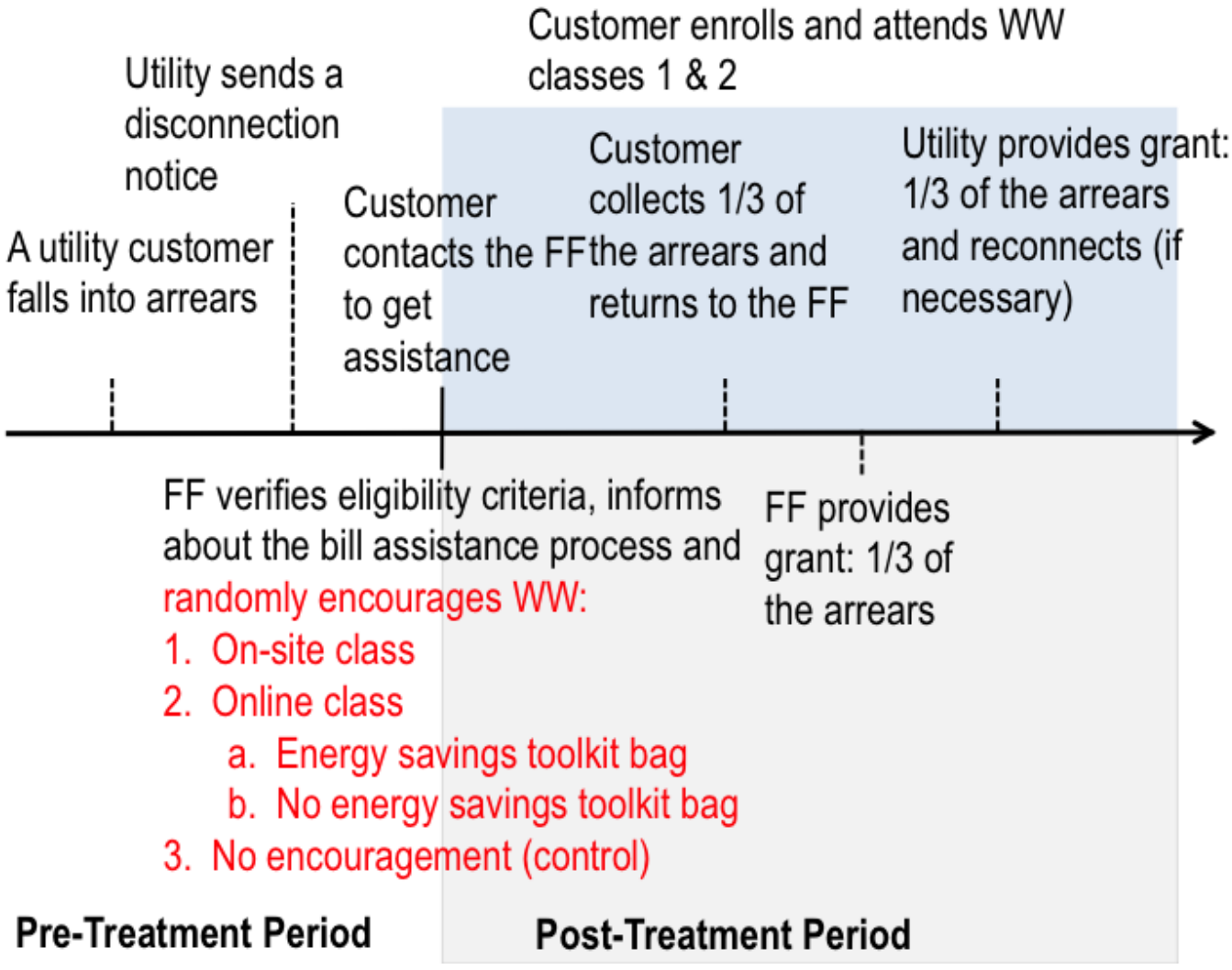
Disconnection lasts for 6.5 months on average!

Why RED?

- We could not perfectly enforce the assignment to the class and not "politically" acceptable to restrict people to enroll in the class.
- Attending the class has a high opportunity cost for this population: e.g., multiple jobs, working on shifts (night and week-end), single parents, mobility issues.

These barriers to attend the on-site class motivated the online class: 45 minutes version of the on-site class that can be taken on a computer or other devices.

Research Design



Research Design: Encouragement

Households with a disconnection notice:

- Contact the FF for assistance
- Are informed of the eligibility criteria, process, and were opted-in (randomly) in a class (on-site or online)
- Received a confirmation letter with time/location of the class or link to the online class (plain letter for control)
- In the letter, subset of clients were informed that they were enrolled in a lottery (cash or in-kind) if they graduated from the class

Results

Compliance: Graduated From the Class

	% Compliance Rate w.r.t. Control: ∼4%
On-site	31.4***
Online	35.3***

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Cash×On-site	27.7***
Cash×On-line	38.3***
In-kind×On-site	31.9***
In-kind×Online	29.3***
No Incentive×On-site	33.0***
No Incentive×Online	36.5***

Compliance: Graduated From the Class

First take-away: modest effect of the online class on graduation although much lower opportunity cost.

Energy Consumption

Intent-To-Treat (ITT):

$$\begin{aligned} log(Energy)_{it} =& \gamma Post_{it} + \beta^{Onsite} Post_{it} \times Onsite_i \\ &+ \beta^{Online} Post_{it} \times Online_i + \alpha_i + \eta_t + \epsilon_{it} \end{aligned}$$

Local Average Treatment Effect (LATE):

$$\begin{aligned} log(Energy)_{it} =& \gamma Post_{it} + \beta^{Onsite} Grad\hat{O}nsite_{it} \\ &+ \beta^{Online} Grad\hat{O}nline_{it} + \alpha_i + \eta_t + \epsilon_{it} \end{aligned}$$

ITT & LATE

	ITT		LATE	
Dep. Var.	log(kWh)	log(therms)	log(kWh)	log(therms)
Post	-0.0937***	-0.0604**	-0.0941***	-0.0584**
Post × On-site	0.00304	0.0101	0.00862	0.0283
Post × Online	-0.0138	0.00372	-0.0348	0.00933

Energy Consumption

Second take-away: the on-site and online classes have no persistent effect over a period of ~ 21 months.

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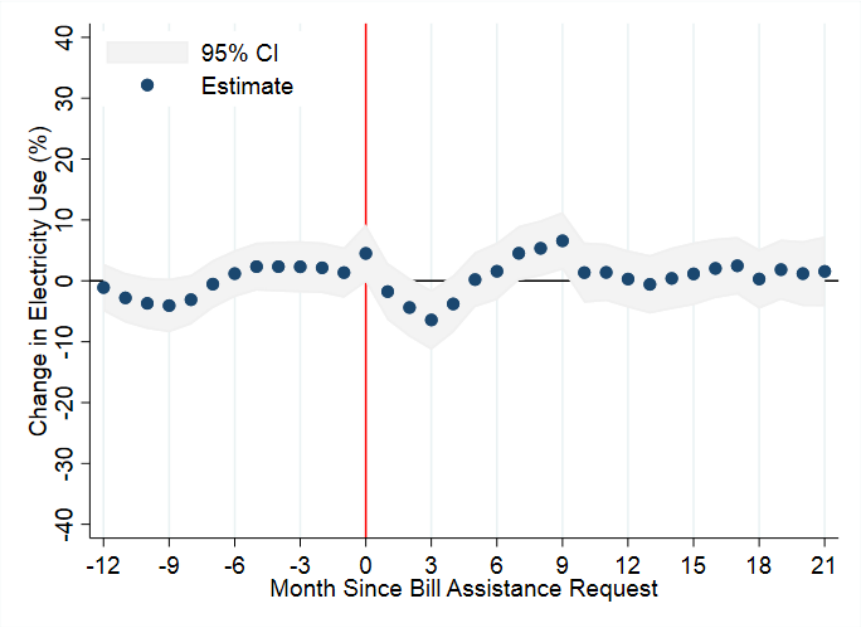
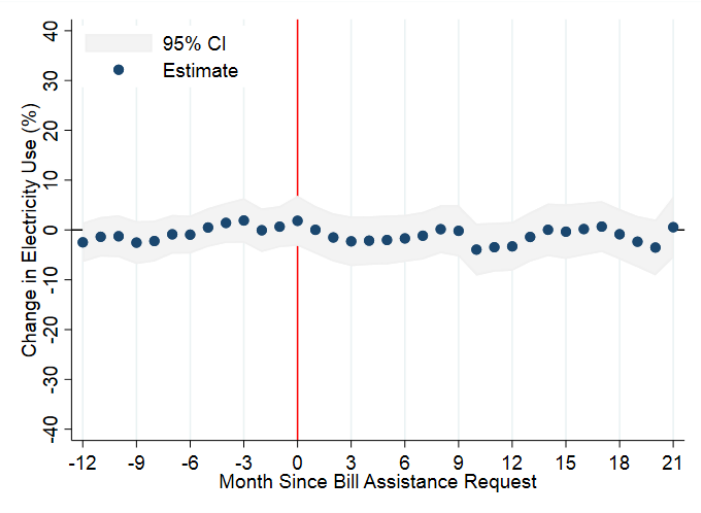
Third take-away: we find a persistent "disconnection notice-effect" for both electricity and natural gas.

Energy Consumption: Dynamic ITT

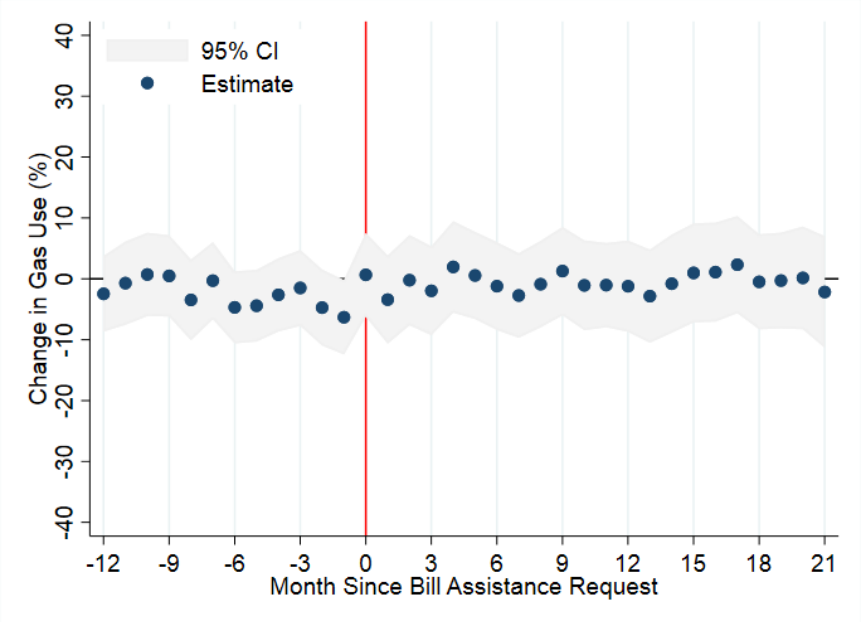
ITT On-site: Electricity



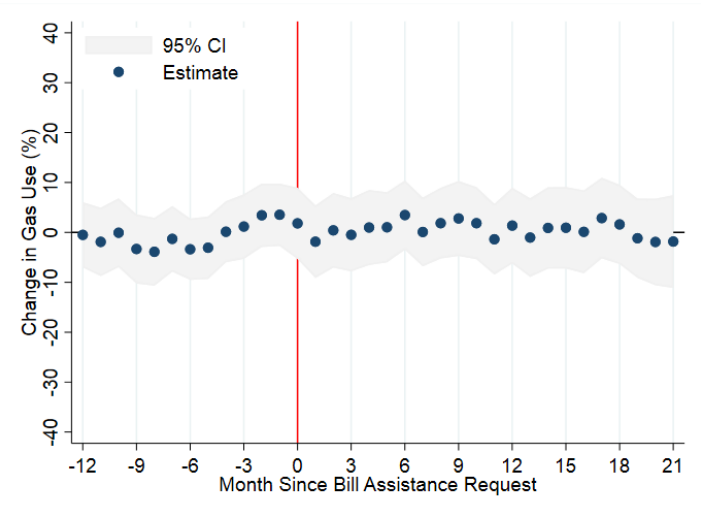
ITT Online: Electricity



ITT On-site: Gas



ITT Online: Gas



Energy Consumption

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Fifth take-away: no noticeable effect for the online class (some specifications show a dip in month 10).

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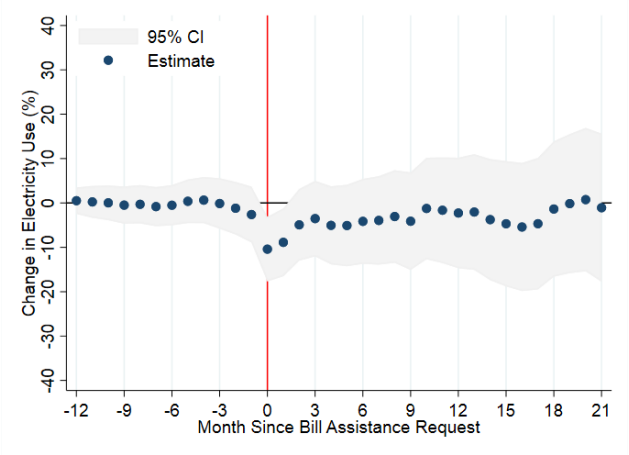
Fourth take-away: the on-site class mimics the seesaw effect of dieting: temporary belt-tightening large reductions followed by "over-comsumption".

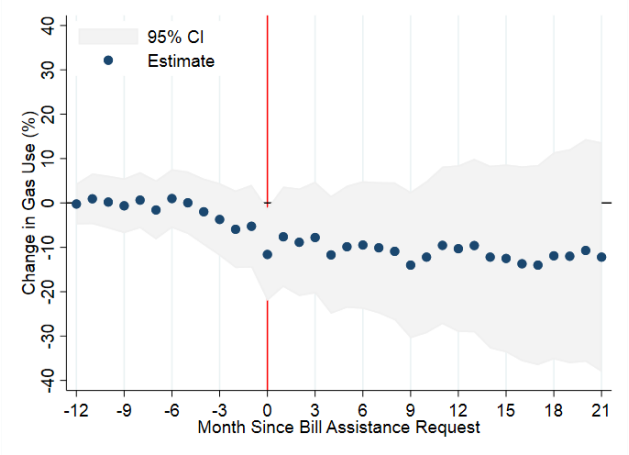
Fifth take-away: no noticeable effect for the online class (some specifications show a dip in month 10).

Sixth take-away: no noticeable effect for natural gas, imprecise (less statistical power) zero.

Disconnection Notice-Effect: Electricity



Disconnection Notice-Effect: Gas



But, no impact on disconnection of services.

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Secondary questions:

- Does the teaching format matter: in-person versus online? Yes
- How to encourage households to attend an energy class? ???
- How does energy behavior change as a response to a class? Hypothesis that households consume at a subsistence level doesn't seem to hold.