Tagging and Targeting of Energy Efficiency Subsidies

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Is energy efficiency for wealthy environmentalists?

- Kahn (2007): "Greens drive hybrids"
- What implications for economic efficiency?

The logic of corrective taxes (or subsidies)

Distortions:

- Environmental externalities
- Credit constraints
- "Landlord-tenant"
- Imperfect information
- Inattention to energy costs

Corrective policies:

- Subsidize energy efficient goods
- Tax or ban energy inefficient goods

Do the policies actually correct the distortions?

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Intro: Targeting of energy efficiency subsidies

- Choice distortions heterogeneous
  - Some consumers' choices are distorted
    - e.g. credit-constrained renters who are uninformed about and inattentive to energy costs
  - Other consumers not subject to distortions
- Definition: A "well-targeted" policy affects more distorted choices
  - "Poorly-targeted" policies can distort already-optimal choices
- Implication for welfare evaluation:
  - It doesn't just matter *how much* energy conservation a subsidy causes
  - It matters *who* is conserving
- Simple test: Do the marginal consumers look like they are subject to the distortions that motivate the policy?
  - e.g. credit-constrained renters who are uninformed about and inattentive to energy costs
- (Picture in the first slide suggests the answer)

This paper

1. Model of optimal subsidies and targeting
2. Empirical results
   - 2.1 Distortions are heterogeneous on observables
   - 2.2 Observables of subsidy adopters
3. Conclusion: Policy implications

A Model of Optimal Subsidies and Targeting

- Modifies Allcott and Taubinsky (2013)
- Consumers make a binary choice
  - Purchase energy efficient good (insulation, hybrid car, etc.)
- Perfectly competitive supply, marginal cost c
- Policymaker sets subsidy s
- Market price $p = c - s$
- Social value is v
- Consumers' perceived private valuation is $\hat{v} = v - d$
- Distortion d from externalities, "landlord-tenant," internalities, etc.
- Two distortion types $j = \{L, H\}$, with $d_H > d_L$
  - $\bar{d} \equiv$Average distortion
- Demand $D(p) = \alpha_L Q_L(p) + \alpha_H Q_H(p)$
  - $\alpha_j =$ Population share
  - $Q_j =$ Share that purchase the good

Targeting and Welfare

Definitions:

- *Targeting* $\tau(s) = cov(d_j, -Q_j'(c-s))$
- *A subsidy is "well-targeted" if* $\tau(s)$ *is high*

Welfare gain from subsidy increase:

$$W'(s) = (s - \bar{d}) \cdot D'(c-s) + \tau(s)$$

Optimal subsidy:

$$s^* = \bar{d} - \frac{\tau(s)}{D'(c-s)}$$

Implications: Poorly-targeted subsidies ...

1. have smaller welfare gains
2. could be small even if population average distortion is large

Tagging and Welfare

- Assume that the policymaker can "tag" in the sense of Akerlof (1978).
  - Limit eligibility to individuals subject to greater distortions
  - To illustrate: Allow type-specific subsidies $\{s_L, s_H\}$

Proposition 1: *If* $Q_L''(p) \approx 0$ *and* $Q_H'' \approx 0$ *for* $p \in [c - s_L^*, c - s_H^*]$, *then the welfare gains from tagging are increasing in* $|\tau(s)|$.

Implication: Good news - poorly-targeted subsidies mean that tagging generates larger gains.

Empirical Results: Heterogeneous distortions

Observable correlates of distortion d:

- Low-income consumers (more subject to credit constraints)
- Rental properties

Covariance of Environmentalism with Beliefs and Attention

	(1)	(2)	(3)	(4)
Dependent Variable:	CFL Savings Belief	Energy Star Savings Belief	MPG Savings Belief	Fuel Cost Calculation Effort
Environmentalist	7.81	21.04	-2.70	0.193
	(3.08)**	(4.80)***	(3.24)	(0.112)*
N	1,475	799	1,392	1,483
Dataset	Lightbulbs	Water Heaters	VOAS	VOAS

	(1)	(2)	(3)	(4)
Dependent Variable:	1(Take up Utility Subsidy)	1(Take up Tax Credit)	1(Own Hybrid)	Subsidy Awareness
1(Green Pricing Participant)	0.015			
	(0.004)***			
1(Installed Solar System)	0.892			
	(0.002)***			
Income ($ millions)	0.543	0.505	0.278	1.022
	(0.066)***	(0.152)***	(0.136)**	(0.720)
1(Rent)	-0.068			-0.084
	(0.007)***			(0.081)
Environmentalist		0.121	0.020	0.248
		(0.024)***	(0.008)**	(0.116)**
Fuel Cost Calculation Effort		0.027	0.017	
		(0.011)**	(0.007)**	
N	75,591	2,982	1,483	1,516
Dataset	Utility	All TESS	VOAS	Lightbulbs
Dependent Variable Mean	.109	.102	.013	0

Mechanisms

1. Consumers who are aware of energy efficiency subsidies are the same types who are informed about and attentive to energy costs
2. Niche goods that appeal to only a small share of population + moderate subsidy + negative correlation between $\hat{v}$ and d.
   2.1 Only rich people, homeowners, and environmentalists like weatherization, hybrids, and CFLs enough to buy them, even with a moderate subsidy

Caveat

- These regressions characterize the average adopters, not marginal adopters
- Average adopter = marginal adopter if zero demand without subsidy
  - Not necessarily a realistic assumption
- At a minimum, it is clear that these subsidies are regressive.
- Doing this convincingly would be a valuable contribution (better than P&P!)
  - Exploit policy changes + dataset including correlates or distortion
  - Allcott and Taubinsky (2014) lightbulbs paper

Conclusion: Policy implications

- Policy arguments that don't justify subsidies:
  - "Market distortions reduce energy efficiency investments"
  - "Subsidies reduce energy use"
- Instead, need to document that the policies correct distorted decisions
  - Measure the "average marginal distortion"
- Tagging could have large welfare gains. Limit subsidies to:
  - Low-income households (e.g. WAP)
  - Landlords/renters
  - Households who have not previously participated in EE programs
- Alternatives if restricted eligibility not possible: Targeted marketing or differentiated subsidies
- Potentially counterintuitive:
  - Many utilities currently target marketing at consumers most likely to be interested in energy efficiency programs. This is most *cost effective* for compliance with current regulation
  - Our results suggest that this approach doesn't maximize *welfare*

- For welfare evaluation, it matters *who* is conserving, not just *how much* energy is conserved.