The Distributional Impacts of Real-Time Pricing

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Summary

- What are the distributional impacts of real-time pricing (RTP)?
  - Context: RTP became default tariff in Spain in 2015
- Challenge: Authors only observe income at the zip code level
- Solution: Assign probabilistic income distribution to each household, allows to "uncover" income heterogeneity within zip codes
- Insight: RTP exposes consumers not only to within-day but also across-month price fluctuations
  - Within-day consumption patterns depend on smart devices ownership and idiosyncratic factors
  - Across-month consumption patterns depend on heating type (electric vs gas) and whether consumers have AC

Findings

- With zip-code level income data: RTP is slightly progressive
- With inferred income distribution: RTP is regressive
  - Switch from annual to monthly prices is regressive
  - Switch from monthly to daily prices is progressive
  - Across-month effect is more important overall
- Main channels: appliance ownership & household locations
- Higher prices & higher price volatility make RTP more regressive & enhance the two channels above
- Increased price sensitivity through smart device adoption makes RTP more regressive

Discussion: Methodology

1. Rural vs urban consumers
   - Homes larger in rural areas → implications for type classification?
   - High share of renters in city → implications for appliance adoption?
2. Is the assumption that zip codes share the same type realistic in Madrid where quarters are very heterogeneous?
   - Are people in Malasaña the same as in Salamanca?
3. You assume that the price elasticity is constant across consumers & across time, assuming away potential consumer learning.
   - Is it possible to provide evidence that the price elasticity is indeed constant?

Discussion: Counterfactuals/policy implications

- RTP is not problematic if prices are low and stable but may be very problematic if prices are high and volatile
- Low-income consumers don't have the means to adopt smart devices

$\Rightarrow$ Important to protect low-income consumers. But how?

1. Appliance adoption?
2. Leaving RTP?
3. Protection against across-month fluctuations?

Appliance adoption

- Low-income consumers more likely to use electric heating
- Could switching to, say, heat pumps reduce regressiveness of RTP?
- Would the savings from such a switch justify upfront installation costs?
  - How would this change across the different counterfactual scenarios?
- Is there scope for adoption of smart technology?

Leaving RTP

- Can price spikes lead to bill shock?
  - It would be useful to report fluctuations in weekly/monthly bills in counterfactuals
  - This may lead consumers to leave RTP- do you see this in the data?
- May it be better for low-income consumers to be on fixed tariffs?
  - After all, they seem not to react to marginal prices and not wealthy enough to adopt smart devices.

Protection against across-month fluctuations

- Many ways to do this (e.g. hedging by retailers, spreading out bill payments)
- But:
  - Will customers understand that any compensation is directly linked to the high prices they are exposed to?
  - If yes, will it be enough to preserve acceptance of RTP?

Summary

- Great paper, well executed, very policy relevant
- Important contribution to the study of distributional effects of environmental/energy policies
  - Important dimension along which to evaluate these policies
  - Distributional impacts can be directly linked to their acceptance
- The paper also underscores the importance of usage patterns in evaluating environmental/energy policies
  - Also relevant for electricity supply side
  - Also relevant in other markets (e.g. EV adoption)