

How Do Consumers Respond to Water and Electricity Pricing?

Evidence from Recent Empirical Studies in Economics

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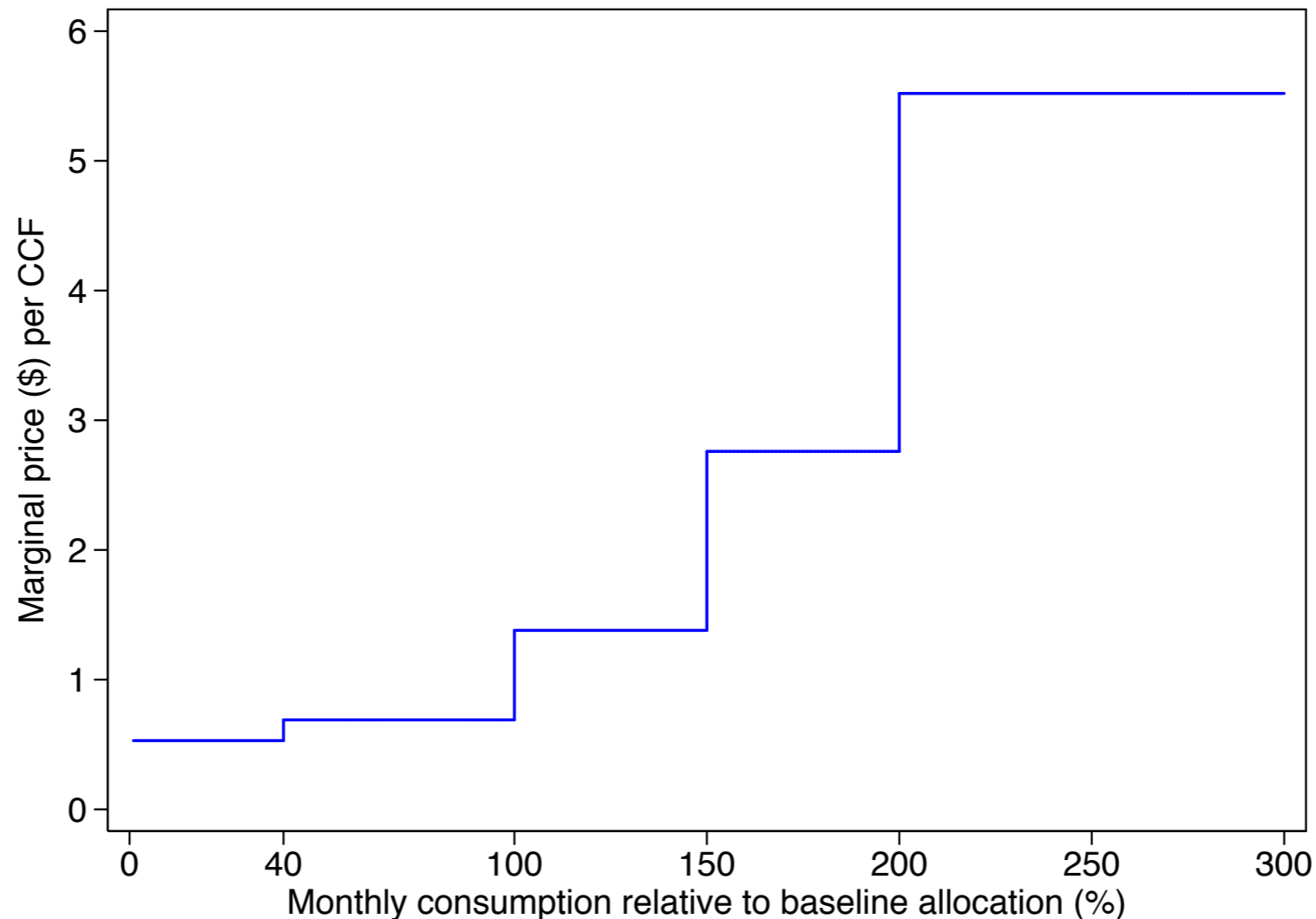
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Two Common Assumptions in Demand Estimation and Forecasting

- 1) Consumers **fully understand** their price schedule
- 2) Economic theory tells us that consumers respond to **marginal price**



Potential Problems about the Two Assumptions

Consumers Are Not Well Informed about their Water or Electricity Prices

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Easy to see what gas
price you are paying



Consumers Are Not Well Informed about their Water or Electricity Prices

Easy to see what gas price you are paying



Hard to see what water price you are paying



Typical Utility Bills: Difficult to Understand

Current Charges Due 09/26/06	\$ 74.34
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(A) Delivery Related Charges:			
Basic Charge	31 days x	\$0.02900	\$ 0.90
Energy Charge:			
Baseline-Winter	313 kWh x	\$0.06825	21.36
Over Baseline 1%-30%	94 kWh x	\$0.06777	6.37
Over Baseline 31%-100%	93 kWh x	\$0.06777	6.30
DWR Bond Charge	500 kWh x	\$0.00469	2.35
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Delivery Subtotal	500 kWh		\$ 37.28
(B) Generation Related Charges:			
DWR Generation:			
Baseline-Winter	92 kWh x	\$0.09490	8.73
Over Baseline 1%-30%	28 kWh x	\$0.09490	2.66
Over baseline 31%-100%	27 kWh x	\$0.09490	2.56
SCE Generation:			
Baseline-Winter	221 kWh x	\$0.02650	5.86
Over Baseline 1%-30%	66 kWh x	\$0.05373	3.55
Over baseline 31%-100%	66 kWh x	\$0.17318	11.43
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Generation Subtotal	500 kWh		\$ 34.79

Example: An Electricity Bill in California

Typical Utility Bills: Difficult to Understand

	--WATER USAGE IN TIERS (CCF)--			
USAGE - LOW VOLUME	6	@	.910	\$5.46
USAGE - CONSERVATION BASE RATE	10	@	1.240	\$12.40
USAGE - INEFFICIENT	0	@	2.760	\$.00
USAGE - EXCESSIVE	0	@	4.700	\$.00
USAGE - WASTEFUL	0	@	9.840	\$.00
TOTAL WATER USAGE CHARGE				\$17.86
WATER SERVICE CHARGE				\$9.30
SEWER SERVICE CHARGE				\$17.20

Example: A Water Bill in California

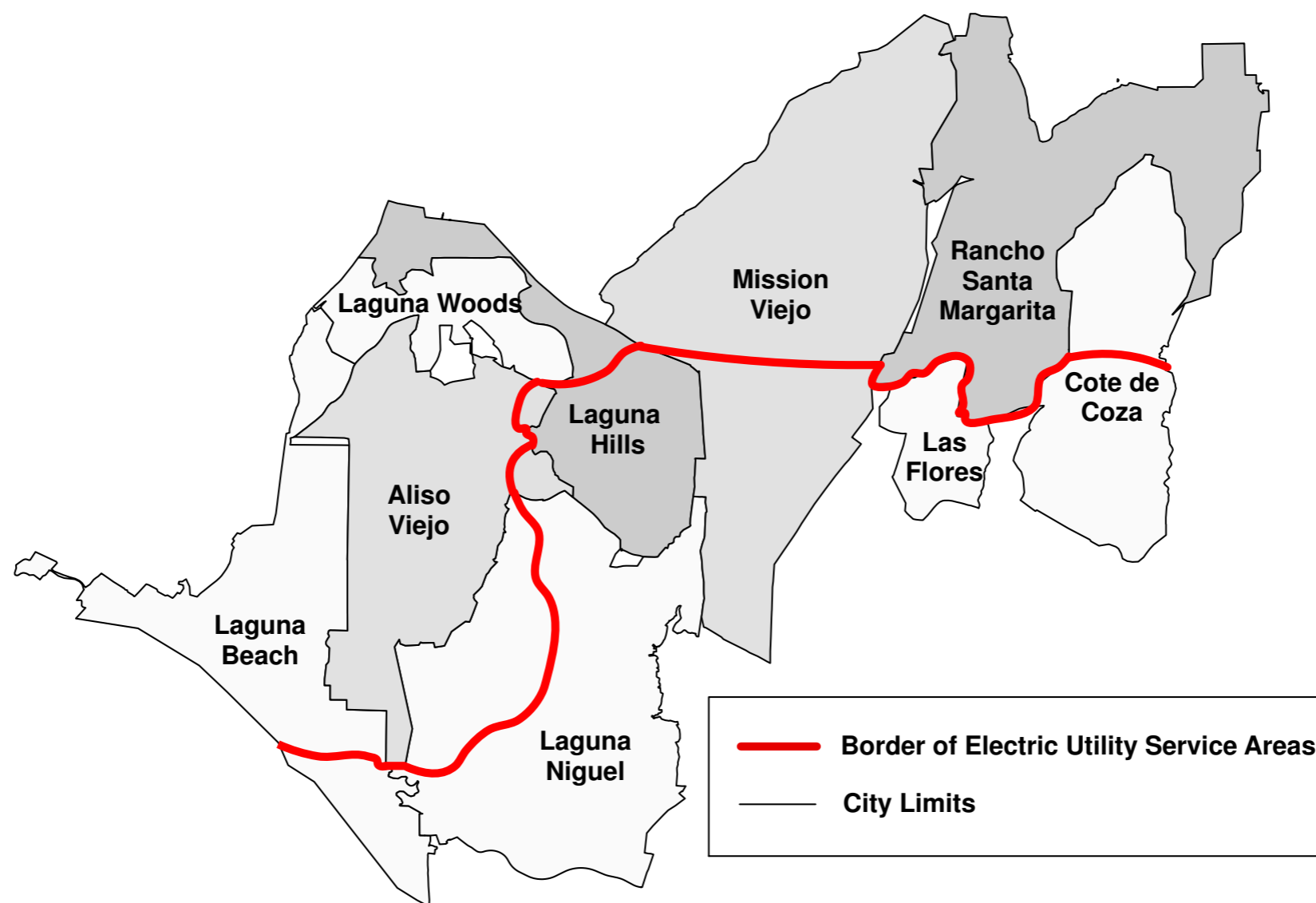
**Given this environment,
Do Consumers Respond to Correct
Marginal Price?**

I Examine How Consumers Actually Respond to Water and Electricity Prices

- Partnered with Water Utility (Irvine Ranch Water District) in CA
- Partnered with Electricity Utilities in CA
- Household-level monthly billing data for about 10 years
 - Electricity consumers: 40,749 households
 - Water consumers: 64,601 households
- Quasi-experimental research design
 - Use **policy changes** as natural experiments
 - Exploit **spatial discontinuities** to create “treatment” and “control” groups

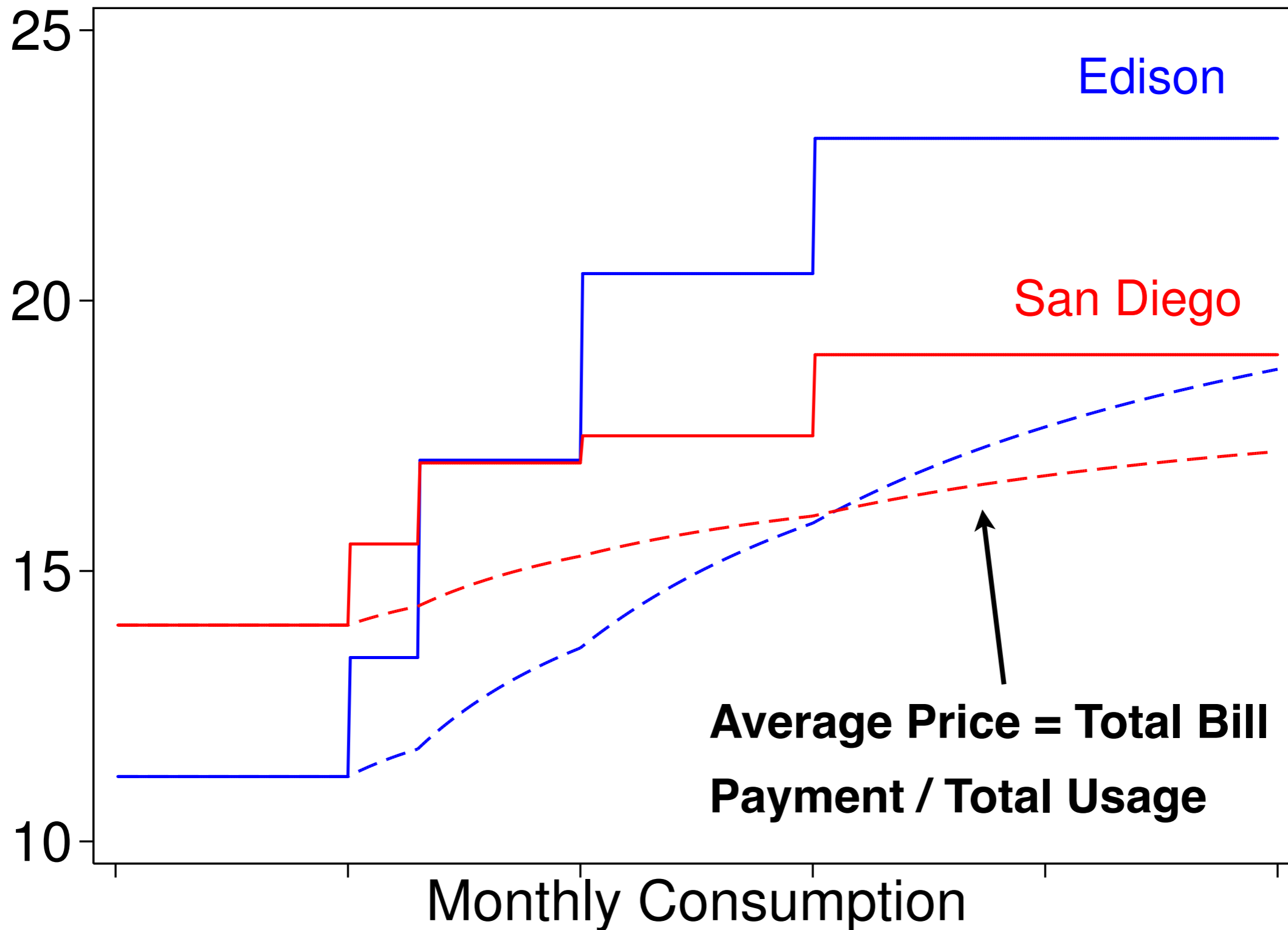
In Orange County CA, Households in the Same City Have Different Power Companies

Edison (Southern California Edison) provides electricity for the north side

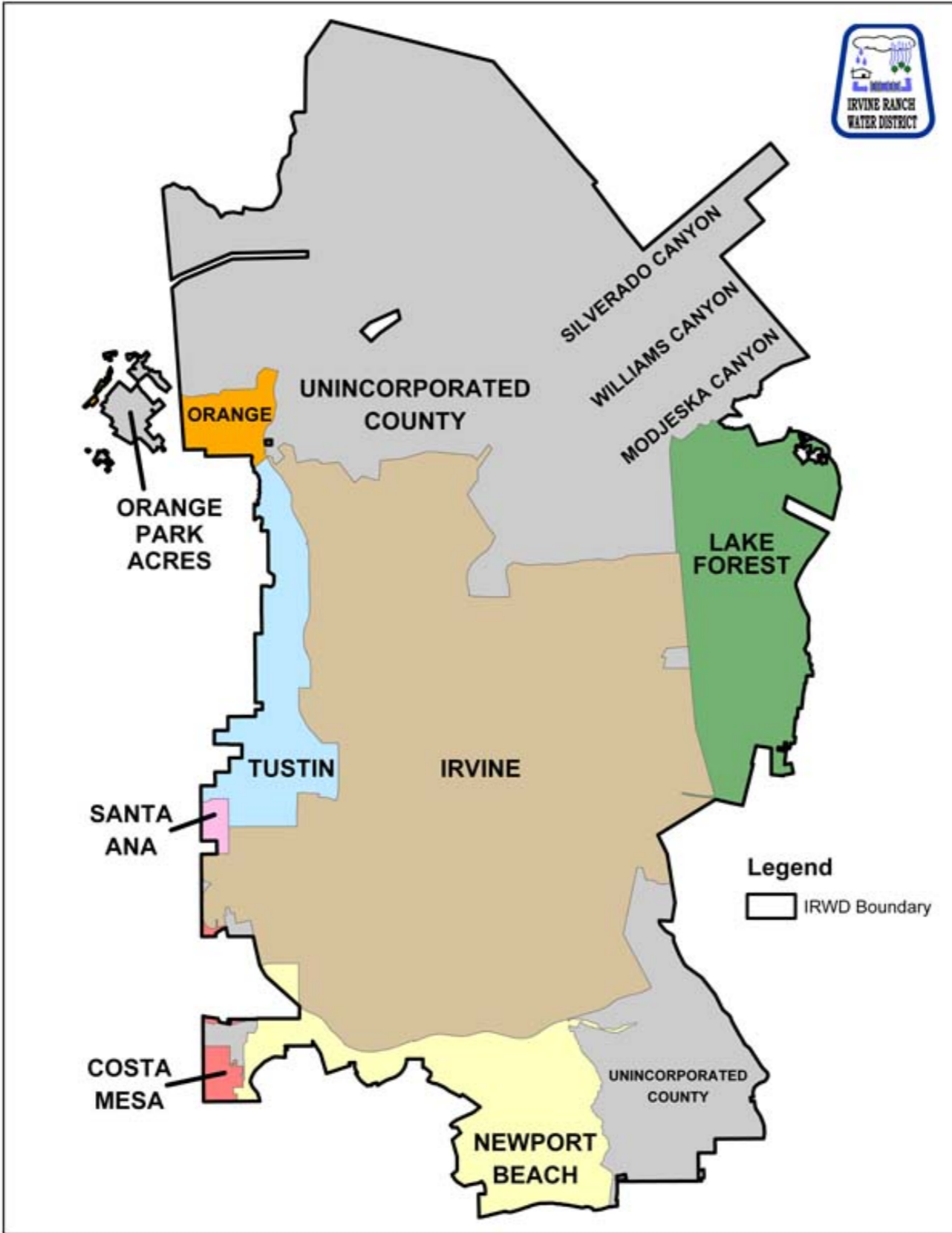


San Diego (San Diego Gas & Electric) provides electricity for the south side

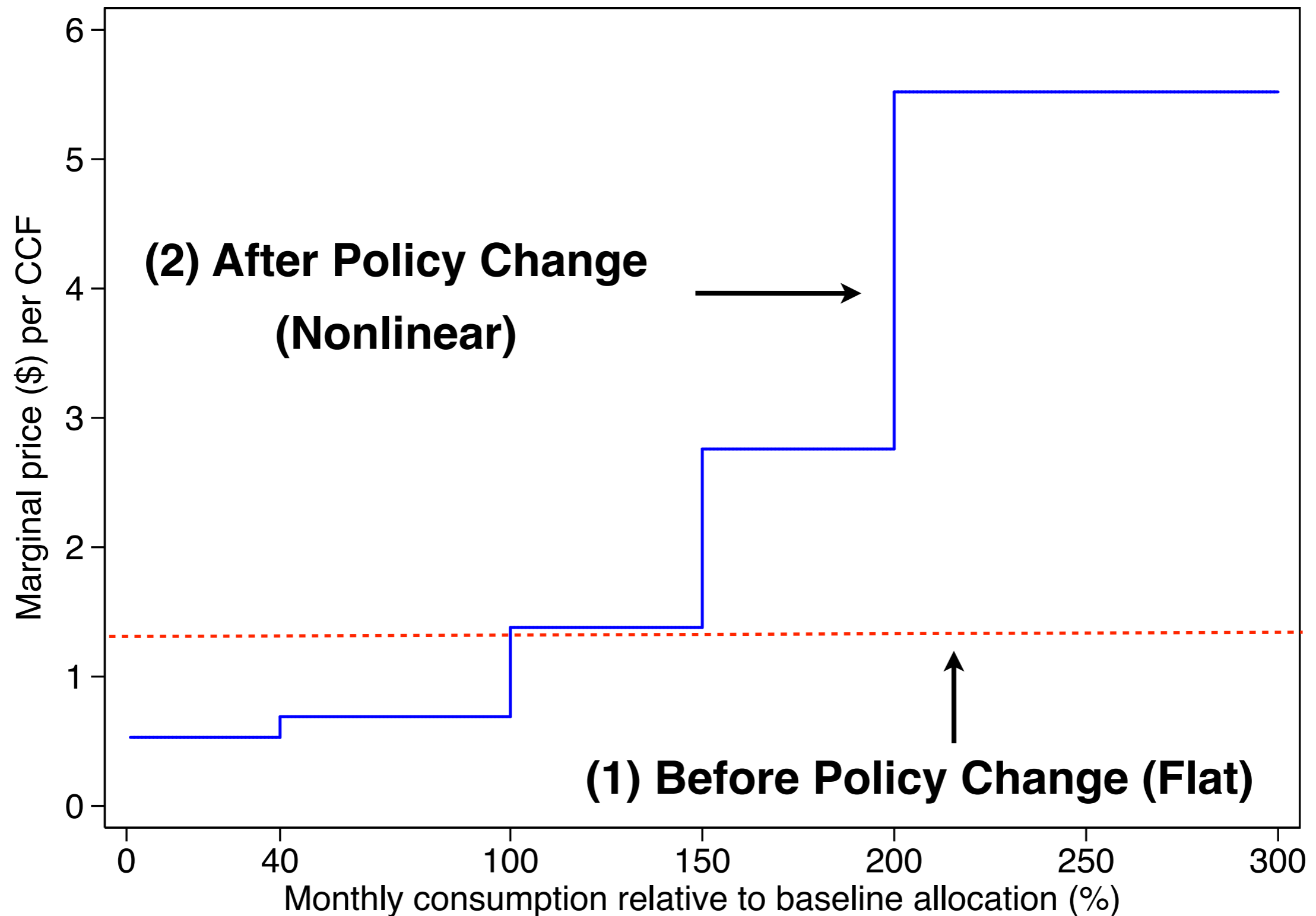
They Experience Very Different Pricing



Similarly, Exploit Policy Changes in Irvine Ranch Water District (IRWD)

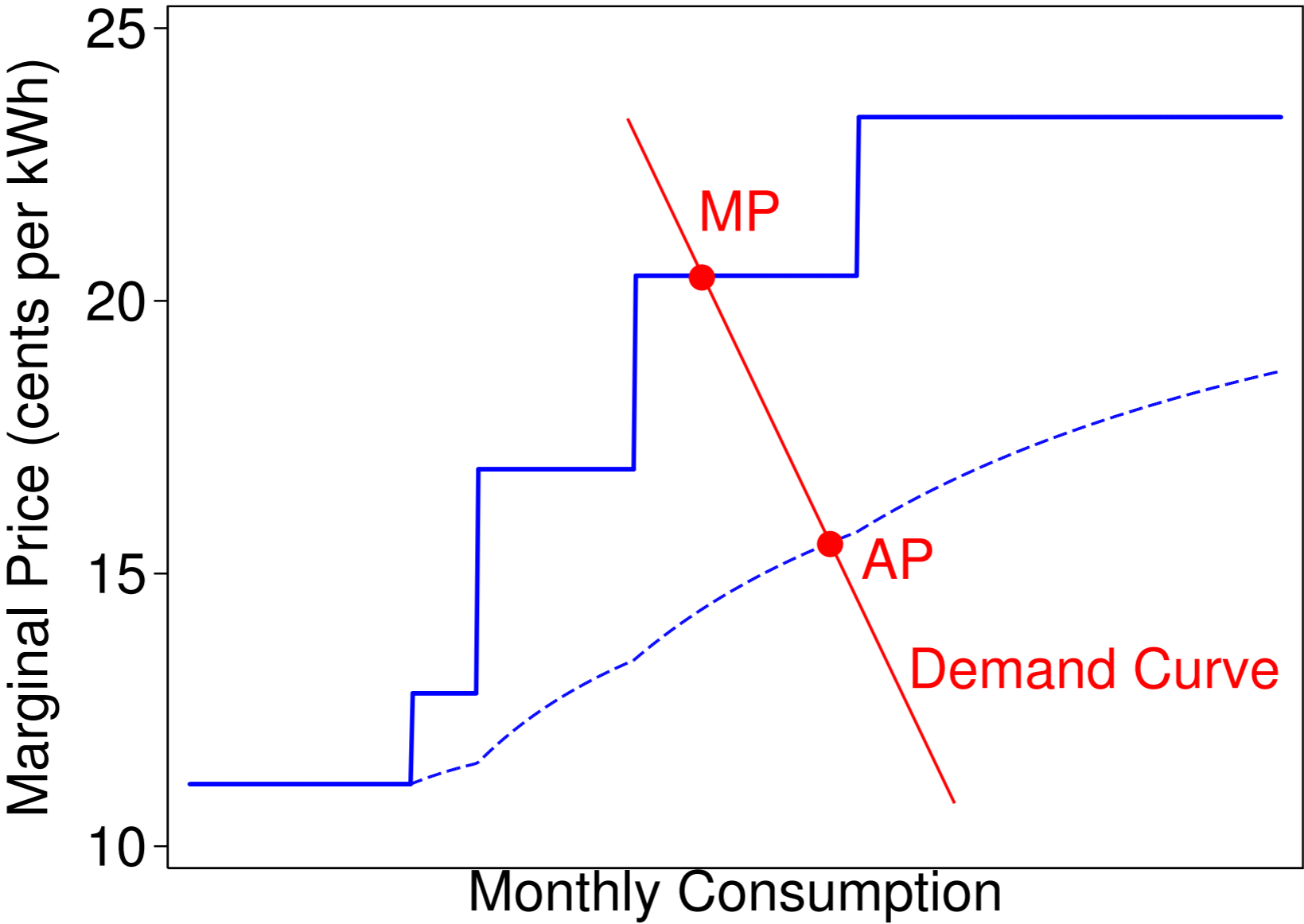


Residential Water Pricing Changed from Flat Pricing to Nonlinear Pricing



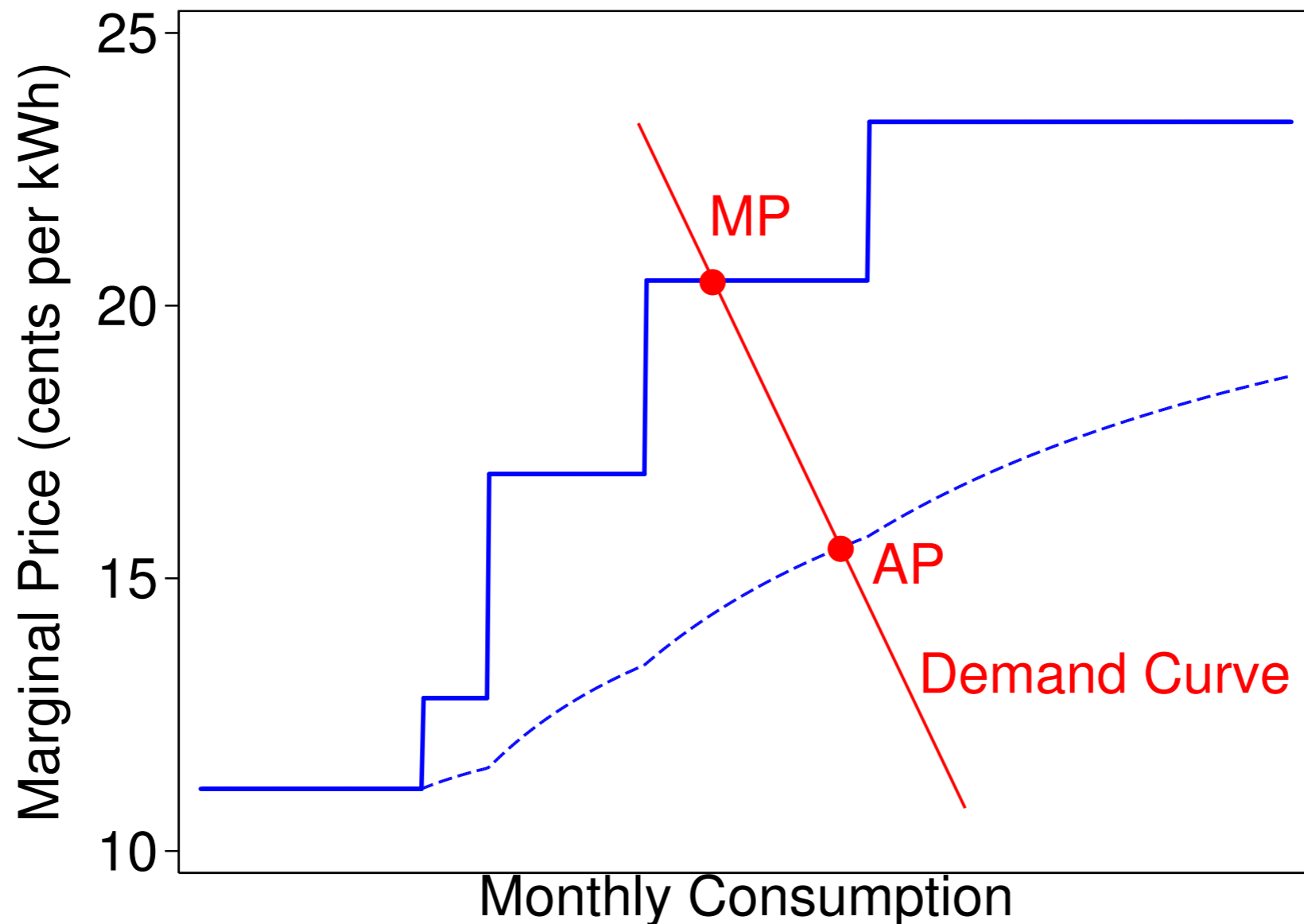
What Do I Find?

Findings: Both Water and Electricity Consumers Respond to Average Price (not Marginal Price)



Why Do We Care about the Findings?

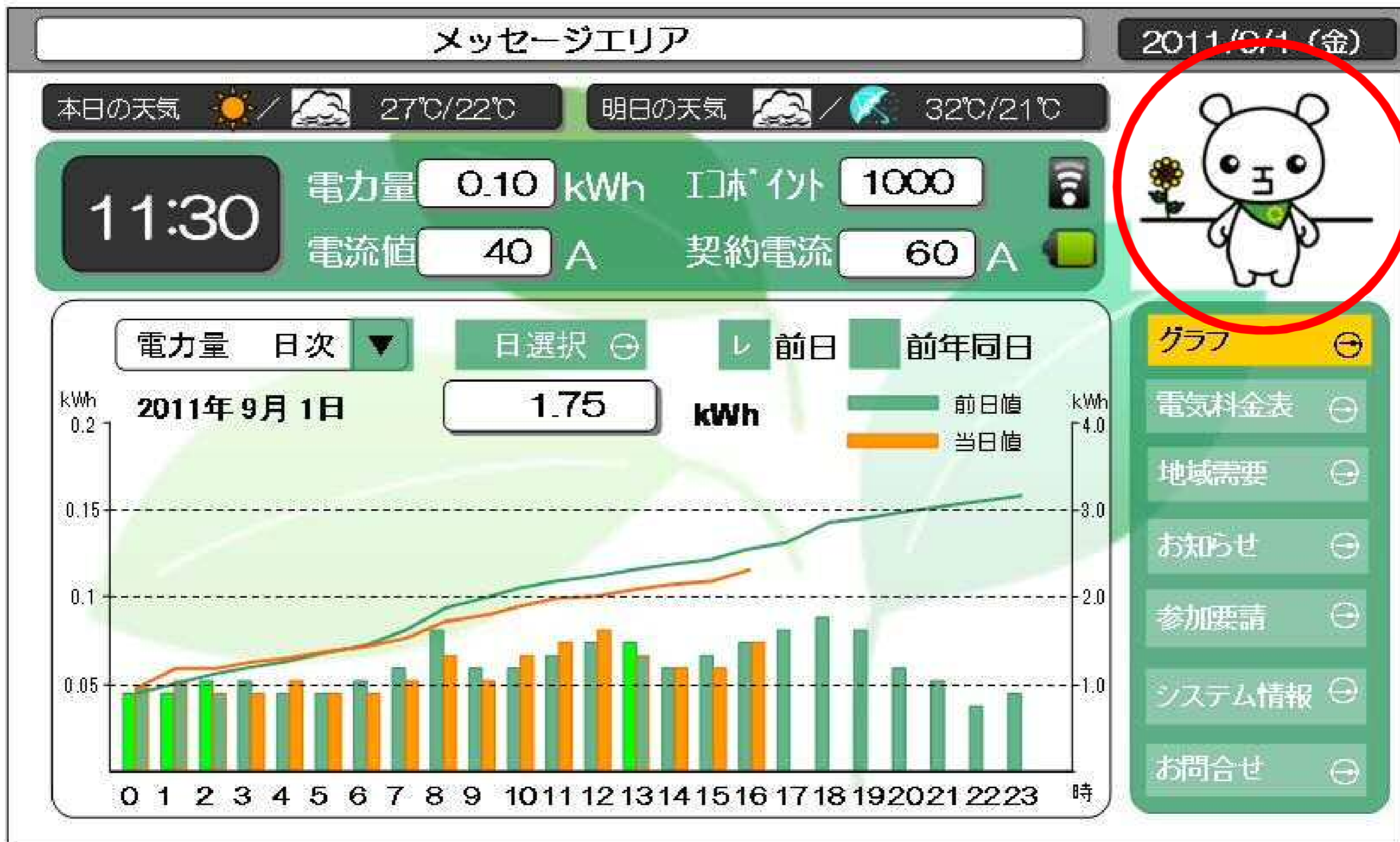
- 1) Responding average price weaken the incentive for conservation
- 2) Forecasts based on marginal price might be biased



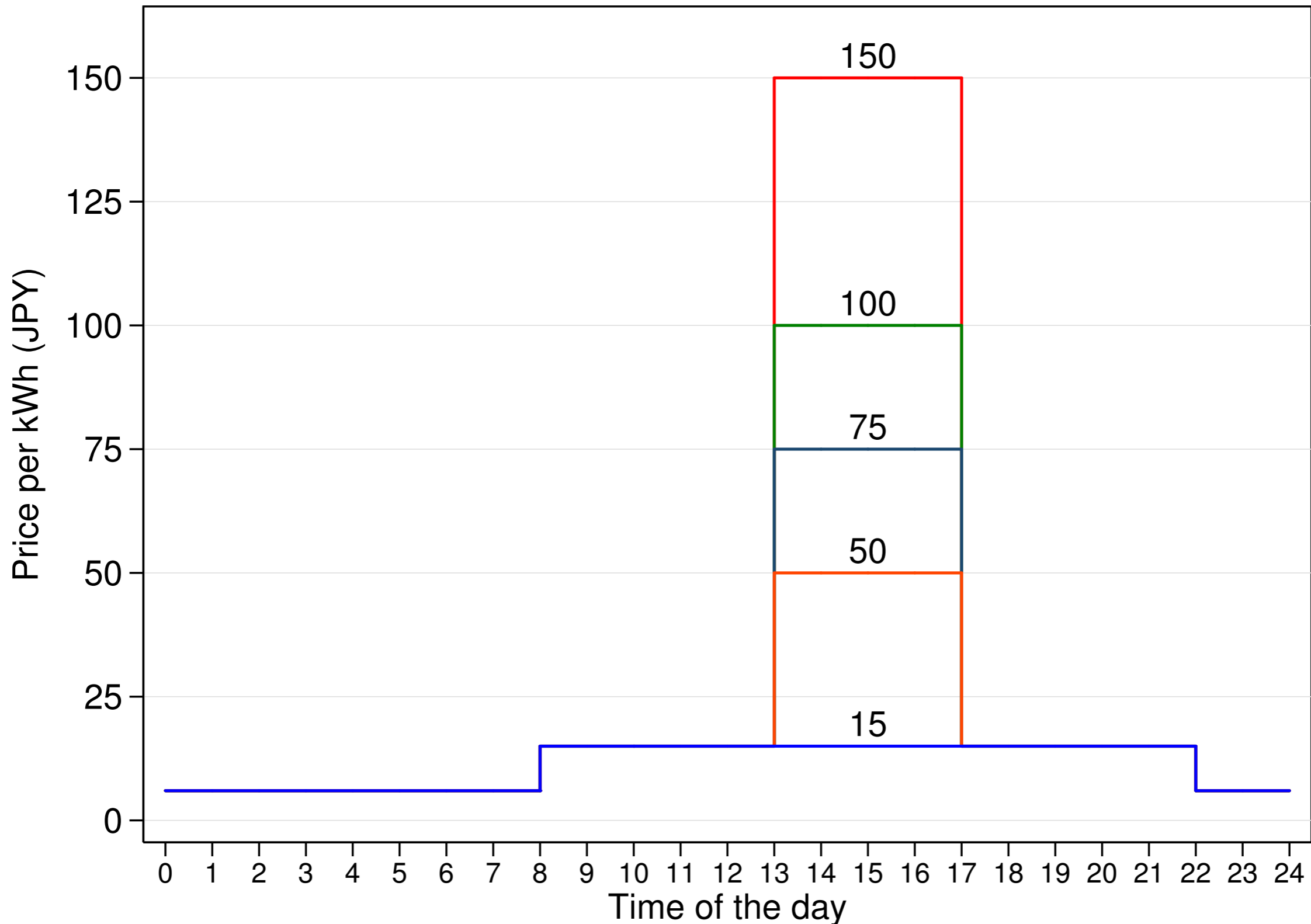
So, What Can We Do?

The Key is:
Providing Better Price Information

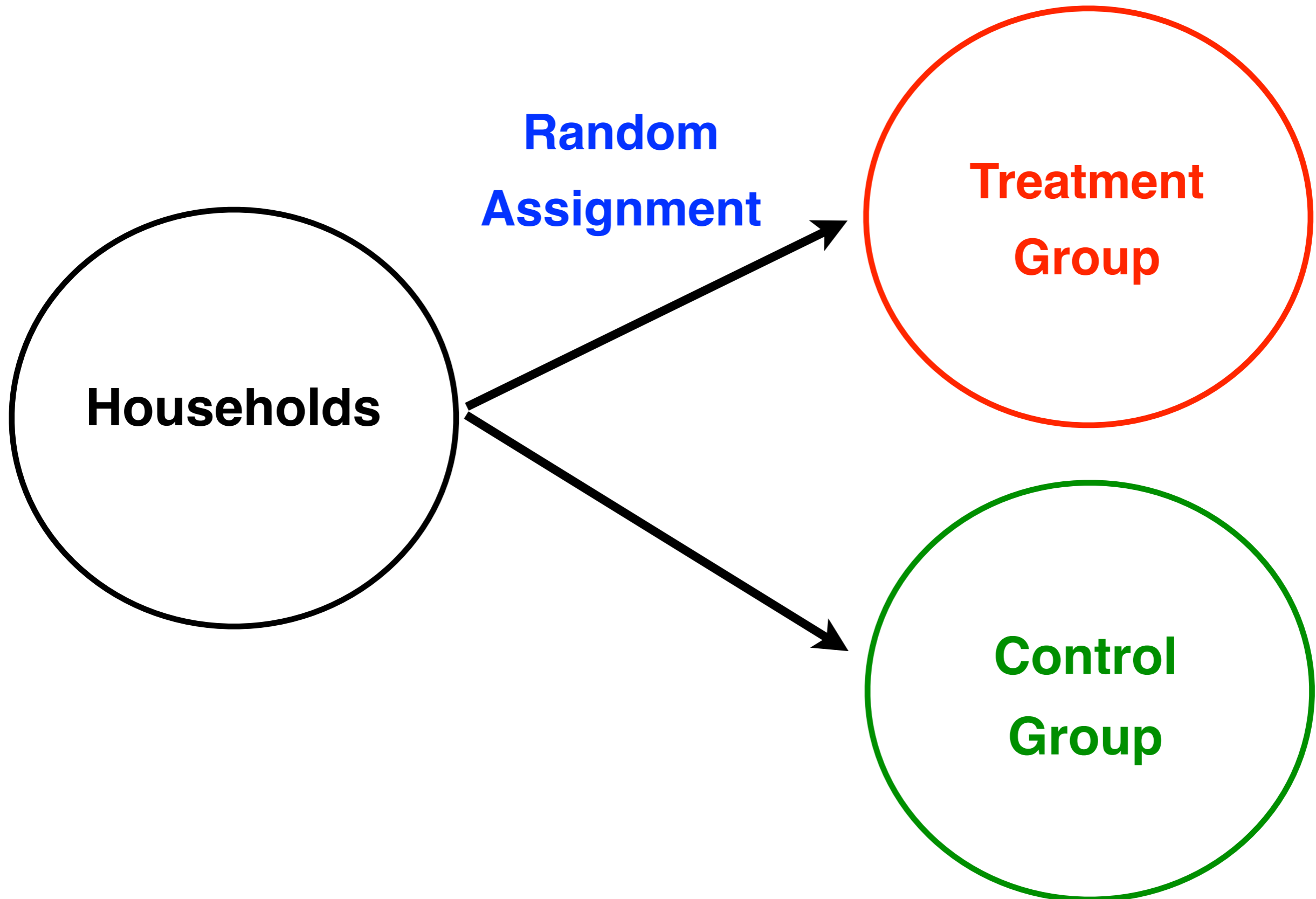
In My Other Research, I Provide “In-home display” for Electricity Consumers



Using the “In-home display”, Consumers Can See Real-Time Information about Price and Usage

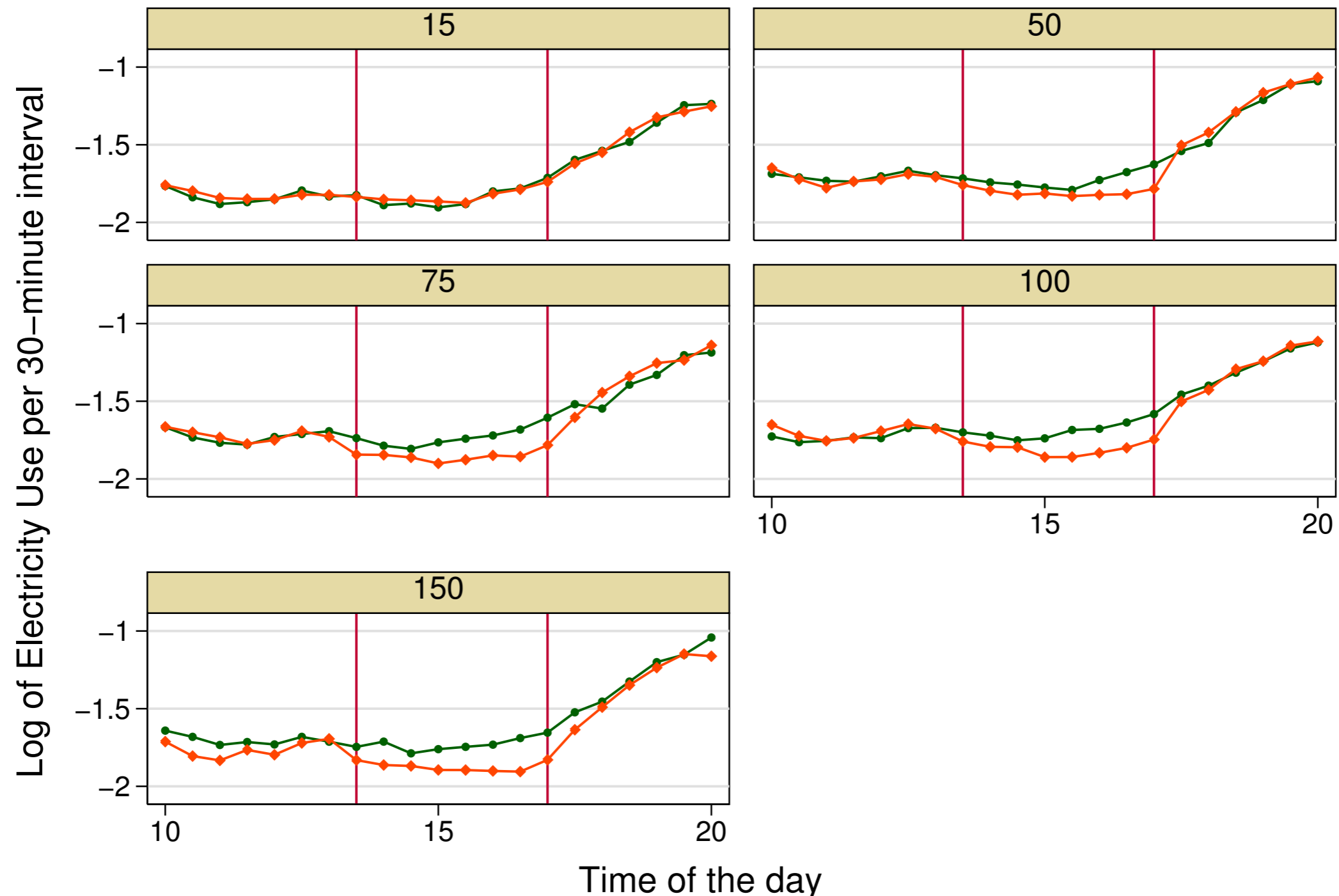


Randomized Field Experiment



When Consumers Have Clear Price Information, They DO Respond to their Price Incentives Correctly

Dynamic Pricing Group (Orange) and Control Group (Green)



Similar Findings from Other Studies: Providing Better Information is the Key

- Teaching Income Tax Code:
 - Chetty and Saez (2013)
- Other Evidence from Electricity Pricing
 - Wolak (2011), Jessee and Rapson (2012), Kahn and Wolak (2013)

Summary:

What Can We Learn from Recent Economic Studies?

- 1) Not-clear price information --> Consumers don't get right price signals
 - Evidence: both water and electricity consumers respond to average price
 - Wrong price signals --> weaken incentives for conservation
- 2) Providing better price information is the key
 - Evidence from electricity pricing and income taxation
 - Consumers respond to price signals correctly when they receive clear info
- 3) Discussion
 - How can we improve the clarity of water price information for consumers?

Thank you for your attention

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