Balancing Affordability and Conservation in Water Rate Setting

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Conservation and Rates

Marginal Price

Consumption

Price Elasticity of Demand

$$\text{Price Elasticity of Demand} = \frac{\%\ \text{Change in Quantity Demanded}}{\%\ \text{Change in Price}}$$

Price Elasticity of Demand for Water

.1 — 1

Conservation and Affordability

Marginal Price

Affordability

Conservation, Affordability, and Revenue

Marginal Price

Consumption

Revenue?

Conservation, Affordability, and Revenue

Total Price

Affordability

Revenue

Measuring Affordability

$$\frac{\text{Average Water Bill}}{\text{Median Household Income}} \leq 2\%$$

Measuring Affordability

Affordability Measured as % Disposable Income

$$\frac{\text{(Basic W+S Cost Per Capita)X HH Size}}{\text{Household Income – Essential Expenses}}$$

Measuring Affordability

Affordability Measured as % Disposable Income

$$\frac{\text{(Basic W+S Cost Per Capita)X HH Size}}{\text{Household Income – Essential Expenses}}$$

AR20= Affordability Ratio for 20th Percentile of Income

Measuring Affordability

Affordability Measured as Hours Minimum Wage

$$\frac{\text{(Basic W+S Cost Per Capita)X HH Size}}{\text{Hourly Minimum Wage}}$$

When Measured Correctly

Fixed Prices

↓

Affordability

Inclining Block Rates

↓

Affordability

Important for Conservation?

Fixed Prices

↓

Conservation

Inclining Block Rates

↑

Conservation

Important for Conservation?

Conservation

Affordability

Takeaway

Lower fixed rates and higher inclining block rates are better for both conservation and affordability!

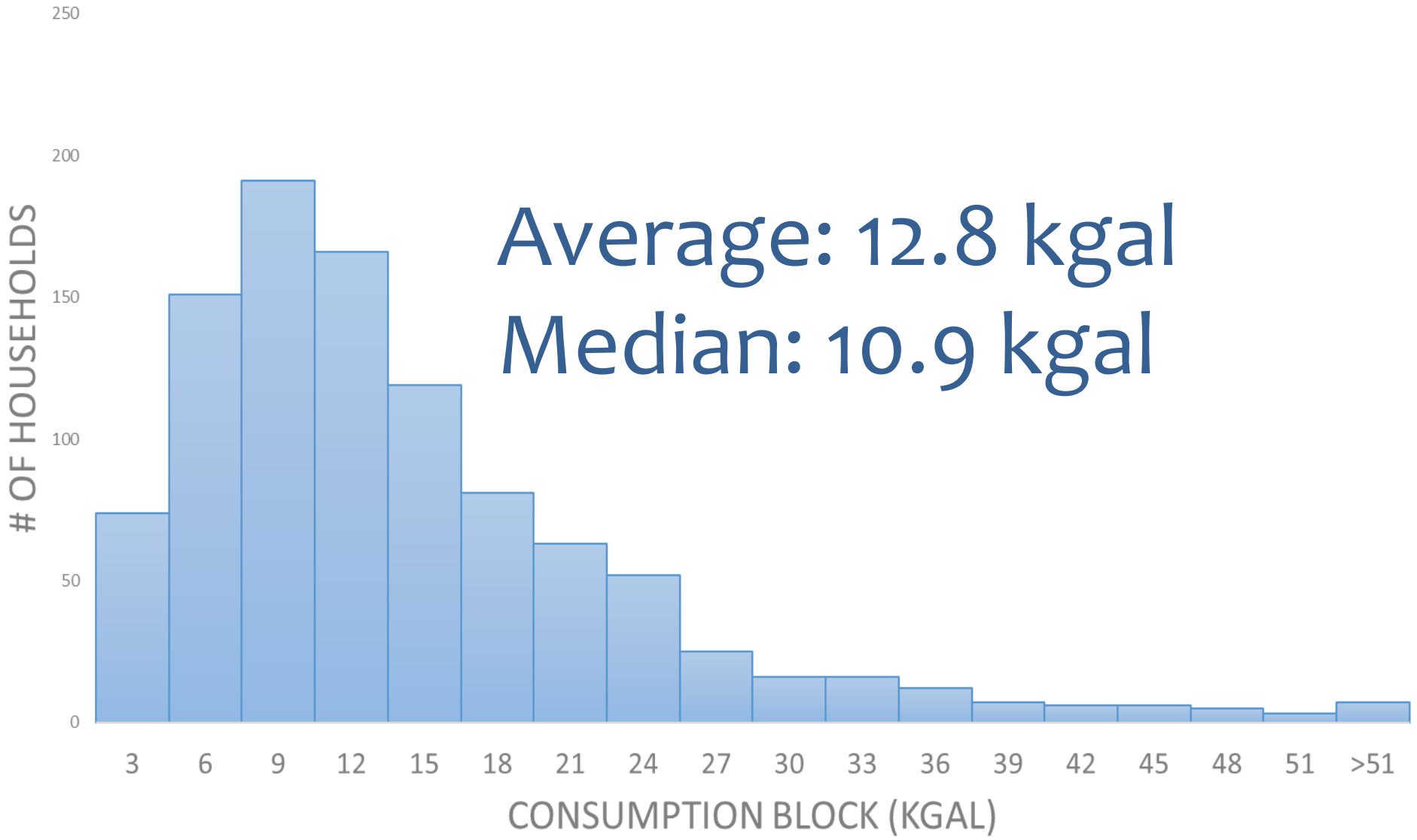
Problems?

- Rate Complexity
- Revenue?
- Revenue Stability

Simulation

- Ratesville, TX
- Town of 1,000
- Uses uniform rate structure with fixed water and sewer rates
- How do different rate structures impact different outcomes?

Baseline Consumption



Simulation

- Evaluating Rates?
  - HM (**target: 8**)
  - AR20 (**target: 10%**)
  - %MHI (**bad target: 2%**)
  - Gallons Used/Saved
  - Rate Progressivity
  - Poehler Index
  - Revenue (**target $125k**)
  - Percent Fixed Revenue
  - Percent Low Use

Simulation

Assumptions:

- Price elasticity of essential use (<6,000 gallons)= **0**
- Price elasticity of non-essential use (>6,000 gallons)= **.5**
- Minimum Wage= **$7.25**
- Monthly Disposable income= **$685**
- Median HH income= **$52K**

Rate Structure 1- Basic Uniform with Fixed Prices

Flat Sewer: **$12**

Flat Water: **$18**

Variable Sewer: **$3.50 per kgal**

Water Variable: **$4.00 per kgal**

Rate Structure 1- Basic Uniform with Fixed Prices

HM	**10.34**
AR20	**10.95%**
%MHI	2.9%
Gallons Used	12.8 mg
Rate Progressivity	0
Poehler Index	1
Revenue	**$126k**
Percent Fixed Revenue	23%
Percent Low Use	10%

Rate Structure 2- Inclining Block with Fixed Prices

Flat Sewer: **$12**
Flat Water: **$18**
Variable Sewer: **$3.50 per kgal**
Water 1st block (up to 6 kgal): **$3.00 per kgal**
Water 2nd block (6 to 12 kgal): **$5.00 per kgal**
Water 3rd block (over 12 kgal): **$7.00 per kgal**

Rate Structure 2- Inclining Block with Fixed Prices

HM	**9.52**
AR20	**10.07%**
%MHI	3.4%
Gallons Used	11.8 mg
Gallons Saved	1 mg
Rate Progressivity	.297
Poehler Index	1.62
Revenue	**$147k**
Percent Fixed Revenue	20%
Percent Low Use	8%

Rate Structure 3- Inclining Block with No Fixed Prices

Variable Sewer: **$3.50 per kgal**
Water 1st block (up to 6 kgal): **$3.00 per kgal**
Water 2nd block (6 to 12 kgal): **$5.00 per kgal**
Water 3rd block (over 12 kgal): **$7.00 per kgal**

Rate Structure 3- Inclining Block with No Fixed Prices

HM	**5.37**
AR20	**5.69%**
%MHI	2.7%
Gallons Used	11.8 mg
Gallons Saved	1 mg
Rate Progressivity	.297
Poehler Index	1.62
Revenue	**$117k**
Percent Fixed Revenue	0%
Percent Low Use	4.5%

Rate Structure 3- Inclining Block with No Fixed Prices Adjusted

Variable Sewer: **$3.50 per kgal**
Water 1st block (up to 6 kgal): **$3.75 per kgal**
Water 2nd block (6 to 12 kgal): **$6.00 per kgal**
Water 3rd block (over 12 kgal): **$9.00 per kgal**

Rate Structure 3- Inclining Block with No Fixed Prices Adjusted

HM	**6**
AR20	**6.35%**
%MHI	2.9%
Gallons Used	11.2 mg
Gallons Saved	1.6 mg
Rate Progressivity	.359
Poehler Index	1.72
Revenue	**$126k**
Percent Fixed Revenue	0%
Percent Low Use	4.6%

But What About Revenue Stability?

Rate Structure 4- Uniform with Fixed Prices and Built in Usage

Flat Sewer: **$16**

Flat Water: **$25**

Variable Sewer: **$3.50 per kgal**

Water Variable: **$6.00 per kgal**

*Consumption up to 3kgal included in fixed prices

Rate Structure 4- Uniform with Fixed Prices and Built in Usage

HM	**9.59**
AR20	**10.15%**
%MHI	2.9%
Gallons Used	11.8 mg
Gallons Saved	1 mg
Rate Progressivity	.495
Poehler Index	1
Revenue	**125k**
Percent Fixed Revenue	33%
Percent Low Use	8%

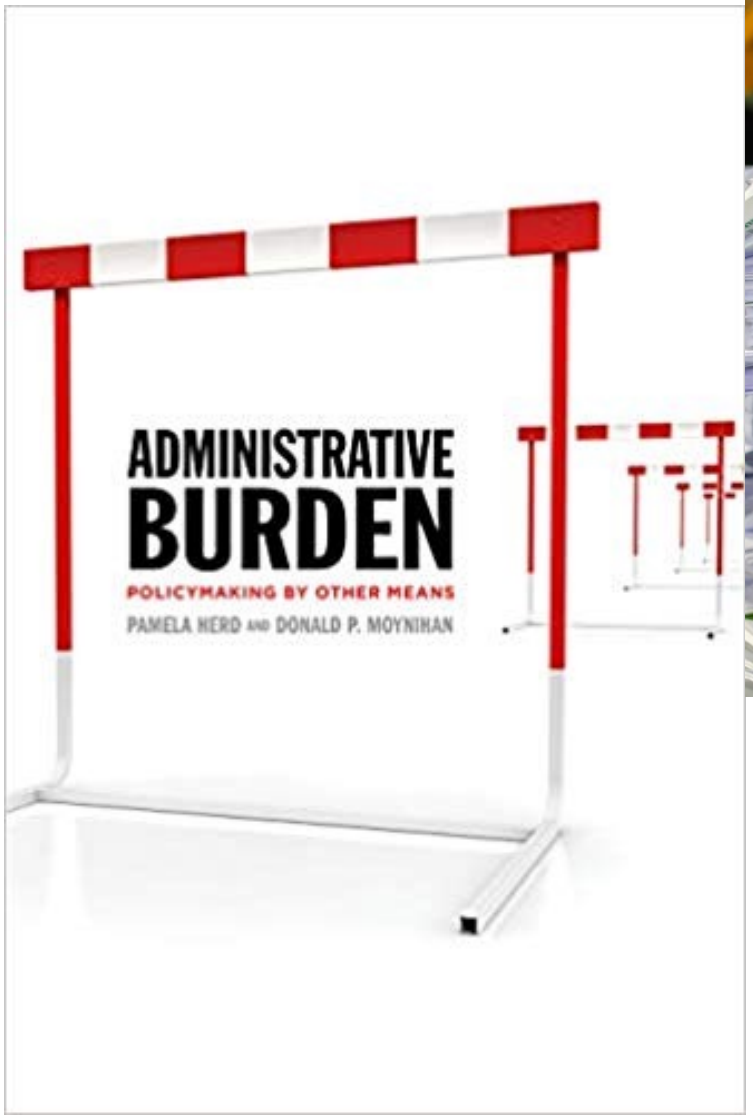
Rate Structure 5- Inclining Block with Fixed Prices and Built in Usage

Flat Sewer: **$17**
Flat Water: **$23**
Variable Sewer: **$3.50 per kgal**
Water 1st block (up to 6 kgal): **$4.00 per kgal**
Water 2nd block (6 to 12 kgal): **$6.00 per kgal**
Water 3rd block (over 12 kgal): **$12.00 per kgal**
*Consumption up to 3kgal included in fixed prices

Rate Structure 5- Inclining Block with Fixed Prices and Built in Usage

HM	**8.62**
AR20	**9.12%**
%MHI	2.9%
Gallons Used	11.1 mg
Gallons Saved	1.7 mg
Rate Progressivity	.593
Poehler Index	2.06
Revenue	**127k**
Percent Fixed Revenue	31%
Percent Low Use	8%

What about affordability programs?



Takeaways

- Measurement matters!
- Fixed rates are bad for affordability
- Inclining block rates are good for affordability
- Affordability and conservation not in conflict, but work hand in hand
- Even if you keep fixed rates, there are ways of making things more affordable
- If you have the resources for affordability programs, you have the resources for careful rate design

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