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FOOD & RESOURCE
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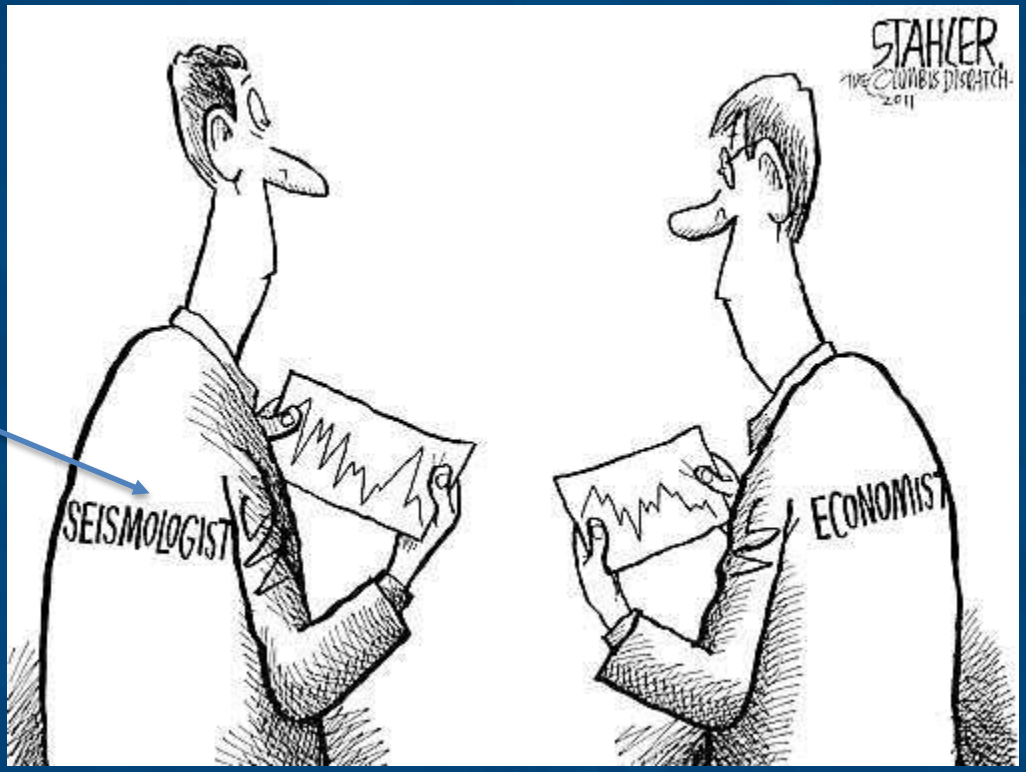
DEPARTMENT

Thresholds of the Florida Urban Water System in a Future World: *Economics Research Component*

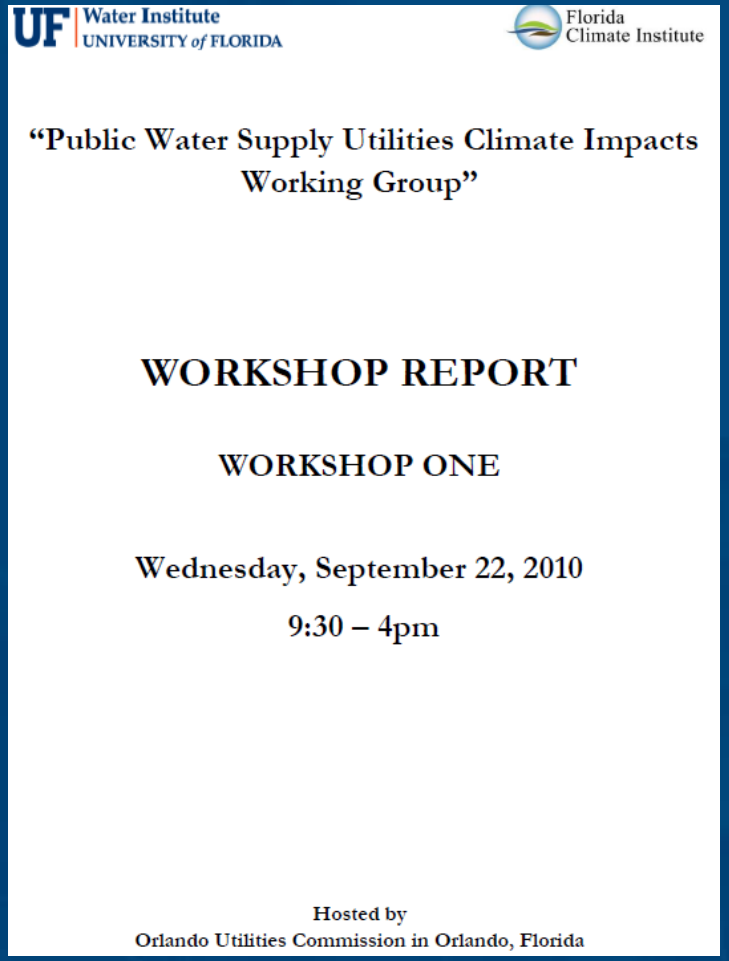
Tatiana Borisova
Associate Professor
Water Economics

Climatologist



2010 Workshop: What we **"NEED"** to help Water Utilities plan for water supply in the face of climate impact uncertainties and risk

- Projections of demand based on demographics, socioeconomics temperature, rainfall projections
- Policies/regulations that are suited & unique to each region



UF Water Institute
UNIVERSITY of FLORIDA

Florida Climate Institute

"Public Water Supply Utilities Climate Impacts Working Group"

WORKSHOP REPORT

WORKSHOP ONE

Wednesday, September 22, 2010

9:30 – 4pm

Hosted by
Orlando Utilities Commission in Orlando, Florida

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FUTURE world: Changes in

i. Sea level rise rates,
ii. Wet season length decrease
Temperature mean / variances
iii. Extreme Events
iv. Aquifer level reductions

Natural System (Surface and ground water hydrology)

i) Aquifer levels / stream flows
ii) Water quality
iii) Seasonality
iv) Variance of weather and climate (droughts, flooding, etc.)
v) Sea level rise

Human System (Water supply and demand system)

i) Landuse Changes (Coastal/Inland)
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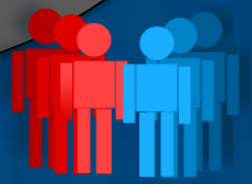
iii) Policies: water withdrawal and allocation
iv) Water suppliers: cost-recovery, conservation, and investments



Water quality / runoff
Water withdrawal rates
Meteorology

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Property-Level Water Demand

Direct Drivers	Indirect drivers
Climate / seasonal variability	**Person characteristics** (e.g., attitudes toward water conservation)
Incentives / disincentives (e.g., pricing, rebates)	**Institutional trust** (i.e., trust in water provider)
Regulations and ordinances (e.g., watering restrictions, planning regulations)	**Interpersonal trust** (i.e., trust in other consumers)
Property characteristics (e.g., lot size, house age, in-ground irrigation)	**Fairness** (e.g., in decision-making process)
Household characteristics (e.g., household size, demographics)	**Environmental values /conservation attitudes**
Person characteristics (e.g., knowledge how to conserve water)	**Socio-economic factors** (e.g., income, age, gender, education, etc.)

Based on: B. Jorgensen et al. / Journal of Environmental Management 91 (2009) 227–236

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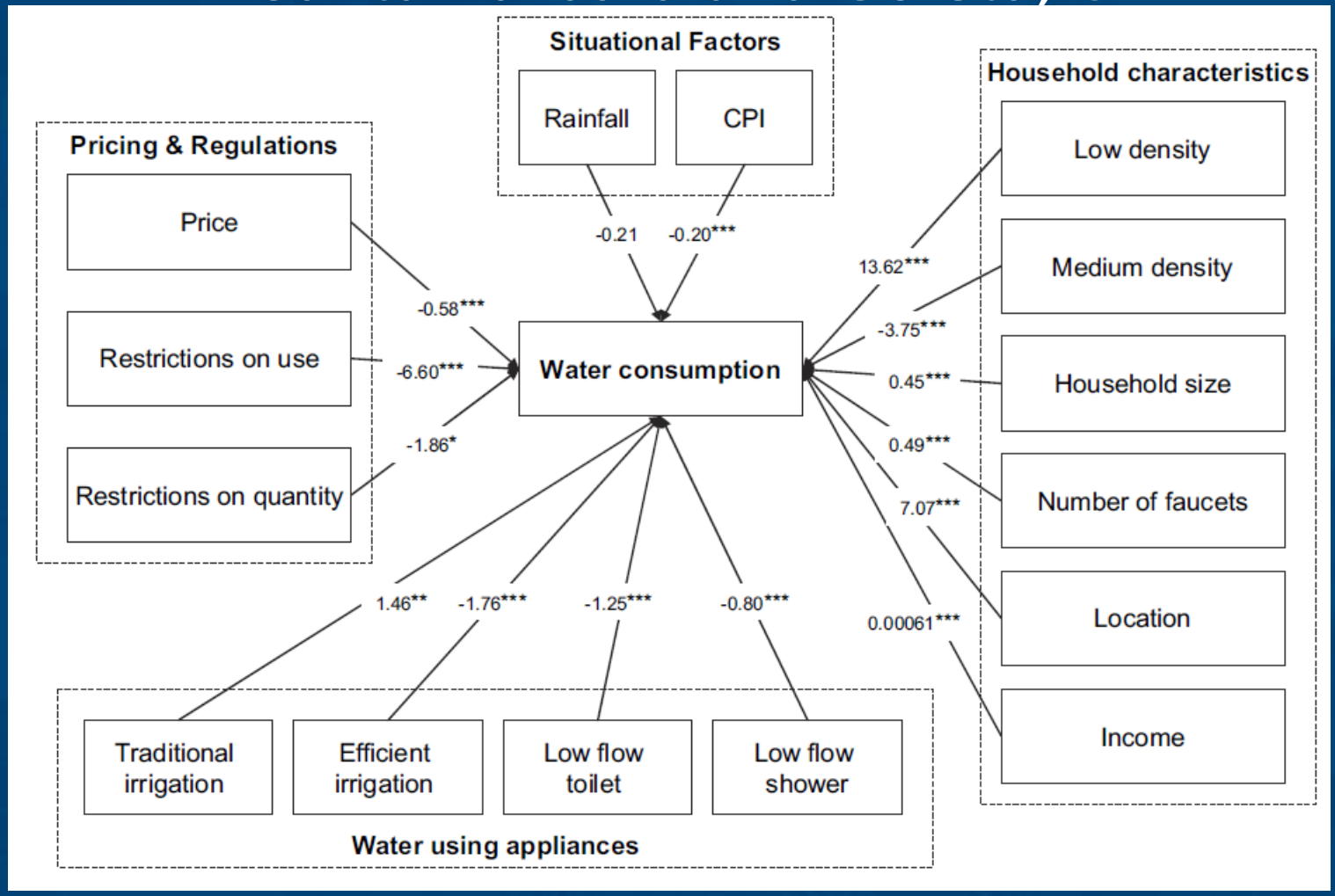
Example:
Econometric models of household water consumption in Santa Barbara and Goleta, CA



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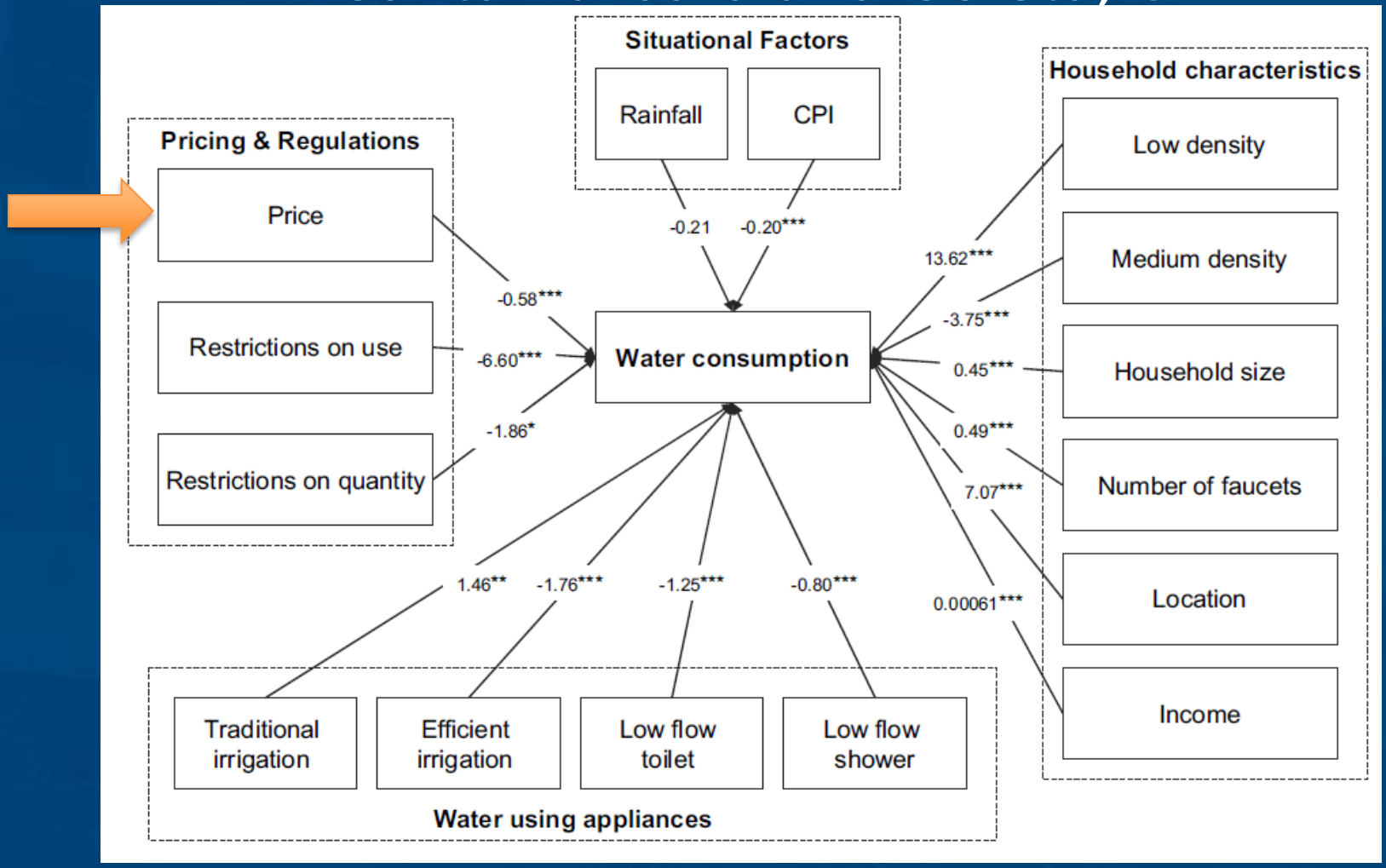

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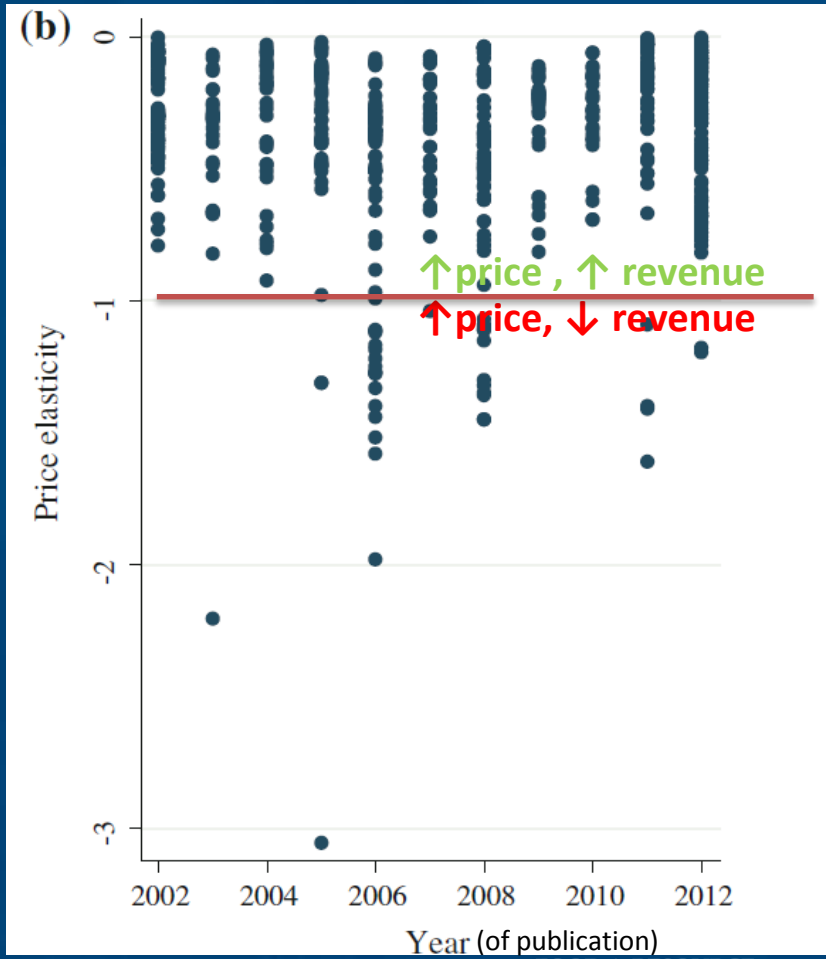
Water demand response to price changes

- 100 studies published in 2002 – 2012, 638 price elasticity estimates
- 10% ↑ price => 3.7% ↓ water use (median; range: 0.0% - 30.5%)
- Utilities can increase revenues by increasing the price
- Price change: achieving water conservation and cost-recovery objectives

Price elasticity = % change in quantity / % change in price



Sebri, M. (2014) A meta-analysis of residential water demand studies, *Environment, Development, and Sustainability*, 16, 499–520.

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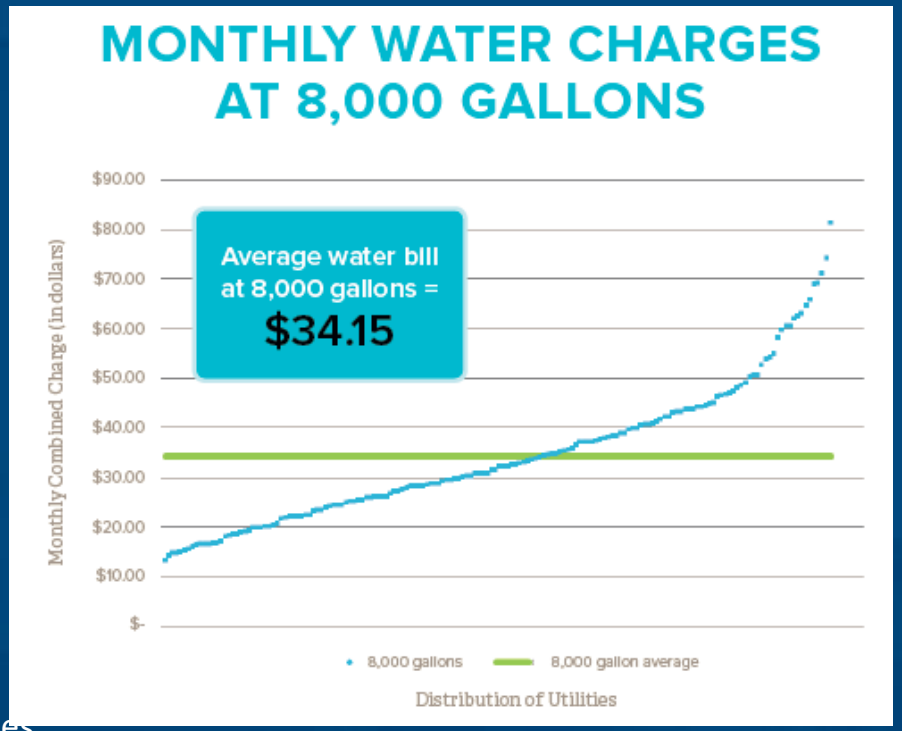
Research Questions

- Demand forecast methods used by different Florida utilities
  - Comparison; Opportunity to refine?
  - Residential, commercial, industrial
- Improving demand forecasting models
  - Responses to significant price increase?
  - High-resolution modeling
    - Indoor vs outdoor demand
    - Hourly / daily demand (smart meters)
  - Additional data on households and property characteristics
    - socio-demographics, landscape attributes, attitudes toward water use, etc.
- Effects of price and non-price water conservation strategies on water use and utilities revenues
- Value of water in residential use
  - (compared to agricultural and in-stream uses?)



Raftelis Financial Consaltunts Inc., 2014 Florida Water and Wastewater Rate Survey

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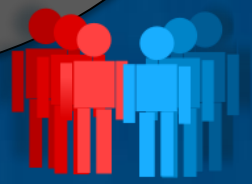

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Policies: Water Withdrawal and Allocation

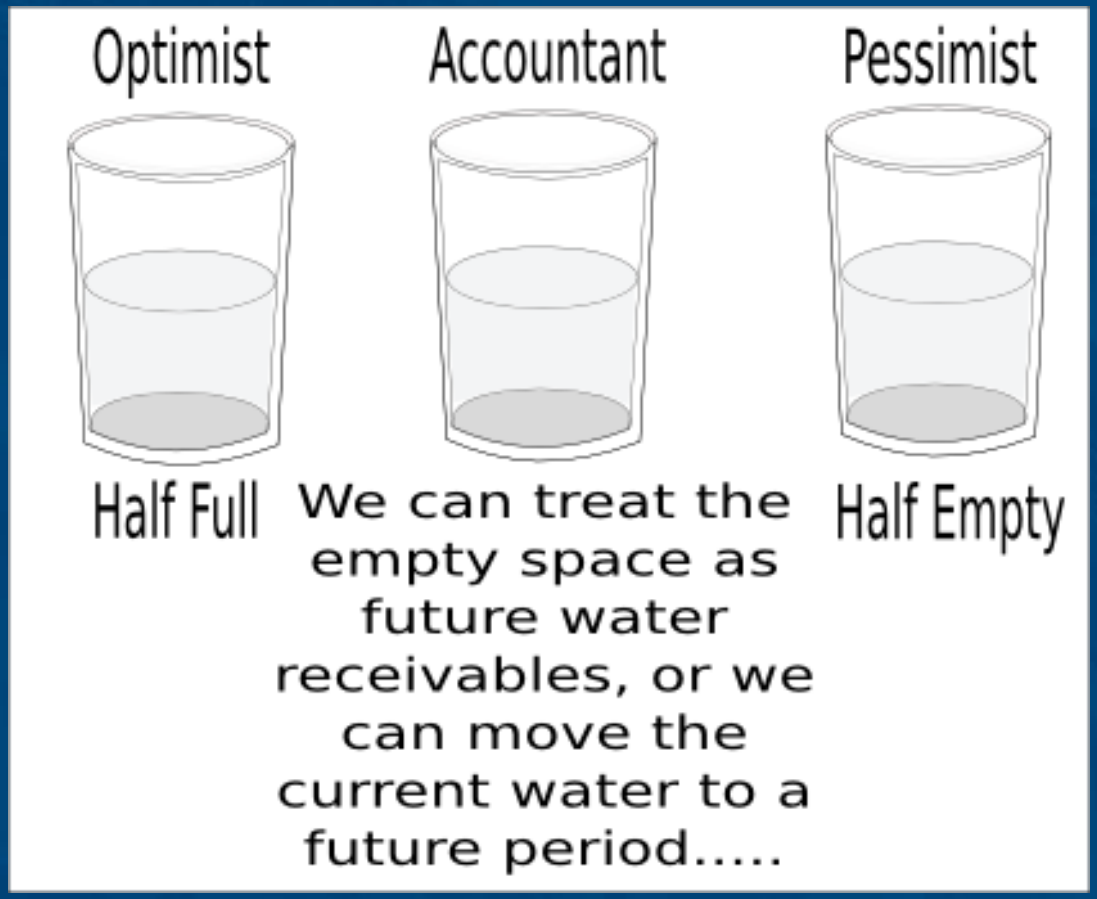
- What is the value of water in alternative uses?
  - Public supply
  - Agricultural use (water demand, value, and costs of water use reduction)
  - In-stream use (ecosystem service provision)

- Innovative policies
  - Water farming: paying for increasing groundwater recharge
  - Paying others to offset increases in water use
  - Fee for water withdrawal

- Optimal level of groundwater withdrawal
  - Withdrawing water today versus leaving it for tomorrow

Water suppliers: cost-recovery, conservation, and investments in alternative supply sources

- Balancing cost-recovery and water conservation objectives
  - Pricing to encourage conservation and delay investments in more expensive sources



http://www.dailygloom.com/cartoons/optimist_pessimist_accountant/

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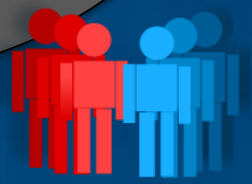

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Connect. Explore. Engage.

Food and Resource Economic Department (FRED)

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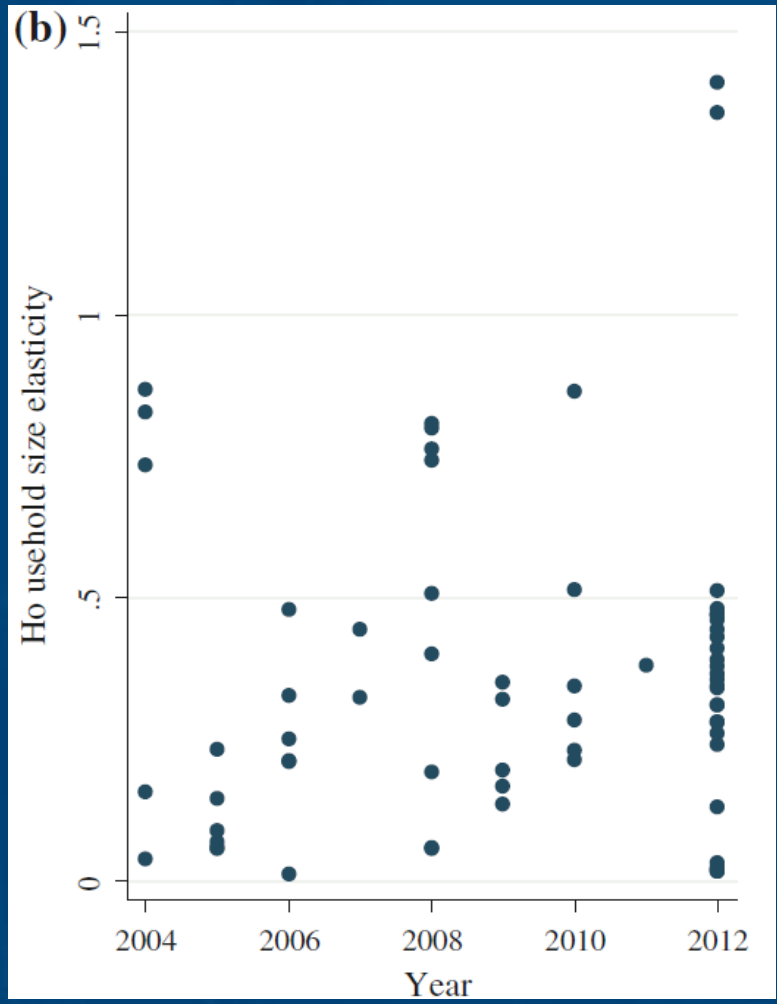
Example: Water demand and household size

- Studies published in 2002 – 2012
- 23 studies, yielding 70 estimates of sensitivity (elasticity) of water demand to household size
- For a family of 4, increase in household size by 1 person will result in
  - 0.3% - 35.3% increase in water use
  - mean of 8.9% increase



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