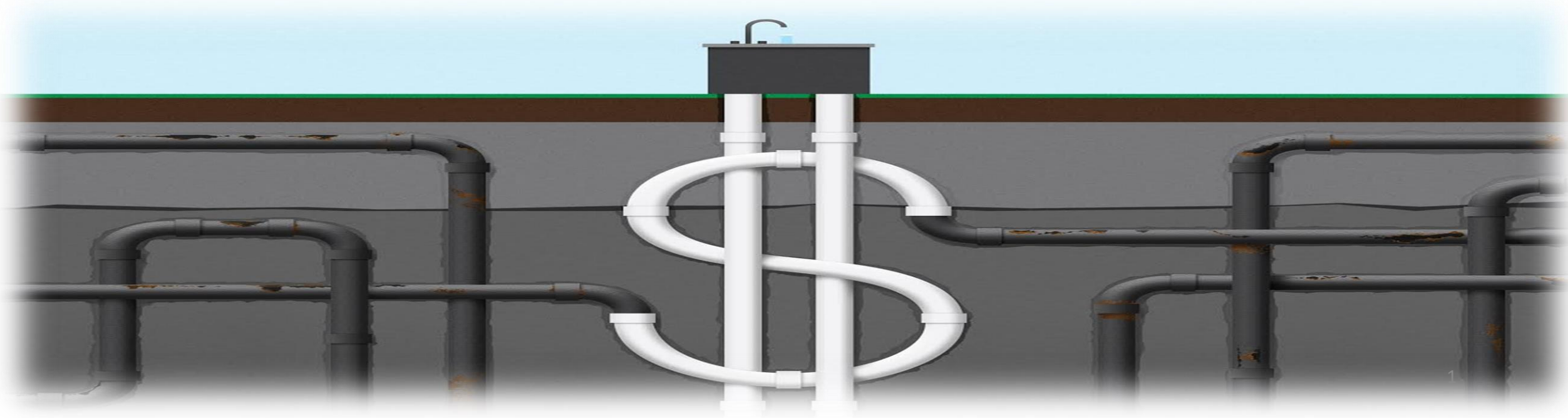
Regulators' Preferences and Underinvestment in Water Infrastructure

Chunyu Guo
Department of Economics
State University of New York at Albany



Background

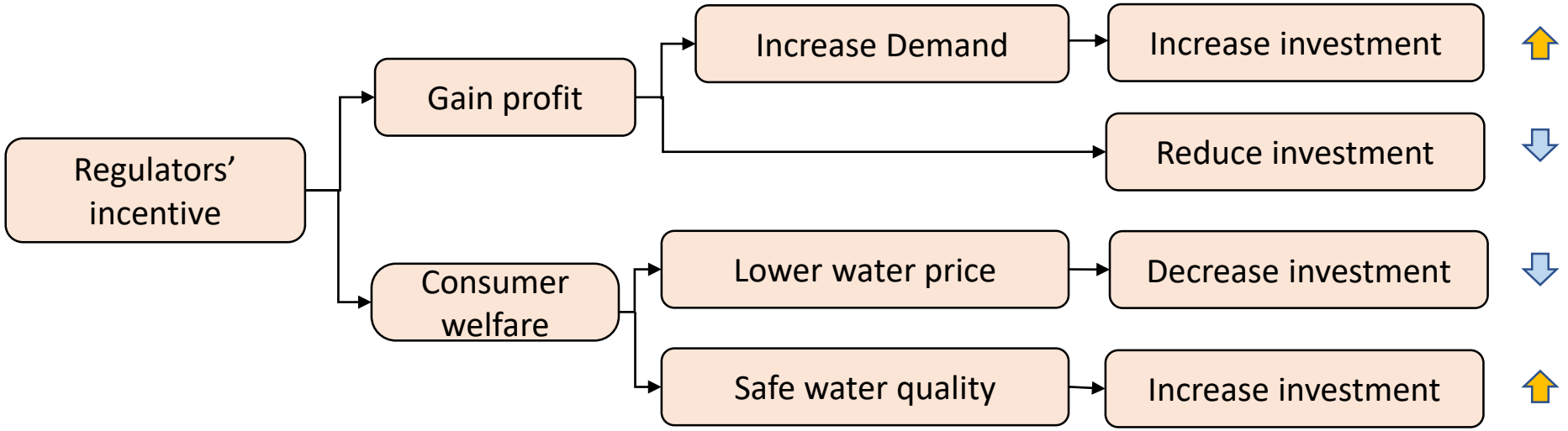
- Underinvestment in drinking water infrastructure
  - Public health crisis; Leaking 12% of treated water nationally(Rupiper et. al.2022))
  - Policy: 2018 America's Water Infrastructure Act; 2021, 45 billion to upgrade water infrastructure
  - Why do the local administrators choose to underinvest in water infrastructure? Why it is hard for the federal effort to reach the local residents?

- Municipal Owned Water Utilities in the U.S.:
  - Supply drinking water to 90% of Americans
  - Small size; unregulated by state government
  - Water utility administrators are water suppliers and also regulators

Research Question

- Question:
  - How does the municipal managers' preference affect their water infrastructure investment?
  - What is the welfare consequence of their preference?

- Preference of Municipal regulator on water:
  - Residents(shareholders) receive dividends in the form of lower tax and higher water services



Model:

- Model regulator's objective function:

Welfare of tax-payers, measured in terms of their surplus from water consumption

Profits from operation (assuming it offsets the tax burdens)

Being able to supply water at a investment level in the future

$$V(s_{it}) = \max_{k_{it},p_{it}} \{v CS_{it}(p_{it}, s_{it}) + (1-v)\pi_{it}(p_{it}, s_{it}, k_{it}) + \beta E[V(s_{it+1})|s_{it}, k_{it}]\}$$

- State Transition function:

$$s_{it+1} = (1-\delta)s_{it} + \lambda k_{it} + \lambda_2 k_{it}^2$$

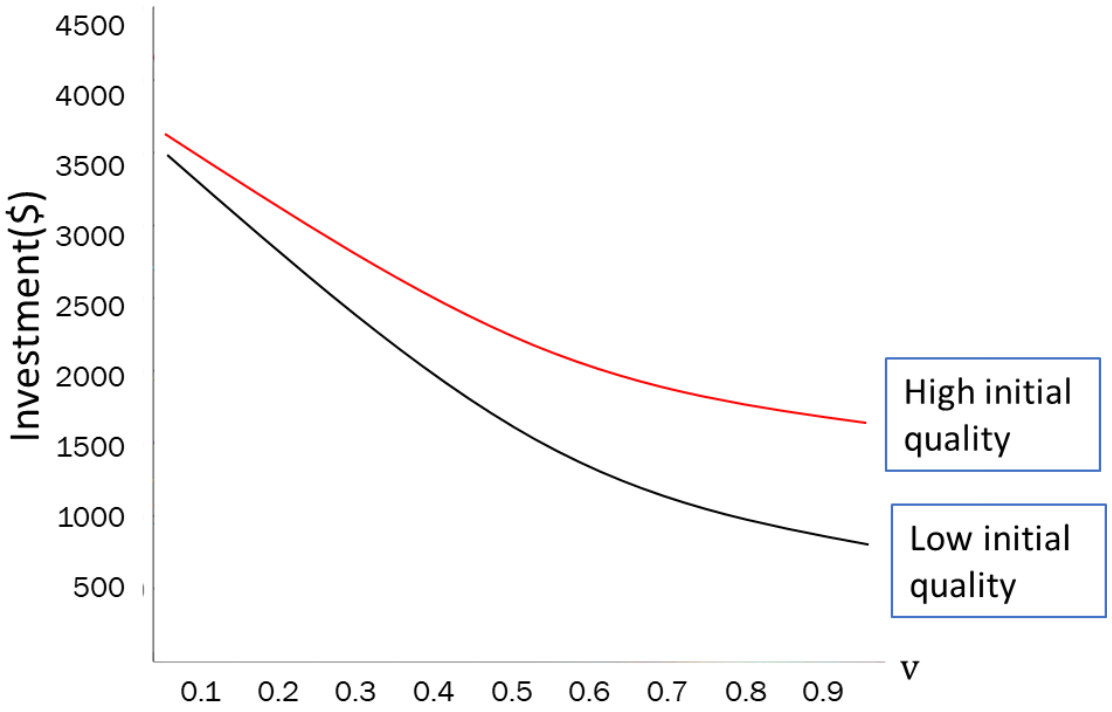
p_{it}: marginal price charged per thousand gallons of water in year in city i in year t;

s_{it}: water infrastructure quality in city i in year t

k_{it}: water infrastructure investment in city i in year t

v : Regulators' preference weight on consumer surplus

Results



- Simulation result: The increase in regulators' preference weight on consumer welfare leads to a lower investment level. This effect is more significant for the utility with low initial infrastructure quality.
- BBL estimation result: $\nu = 0.77$ -- water utility regulator has more preference over the welfare gain for the water consumers from water consumption compare with profit gain to offset the tax burdens.
- Counterfactual analysis result: Biased preference leads to the loss of social welfare. Policies adjusting the biased preferences will be helpful, such as workshops to facilitate communication among consumers and regulators.