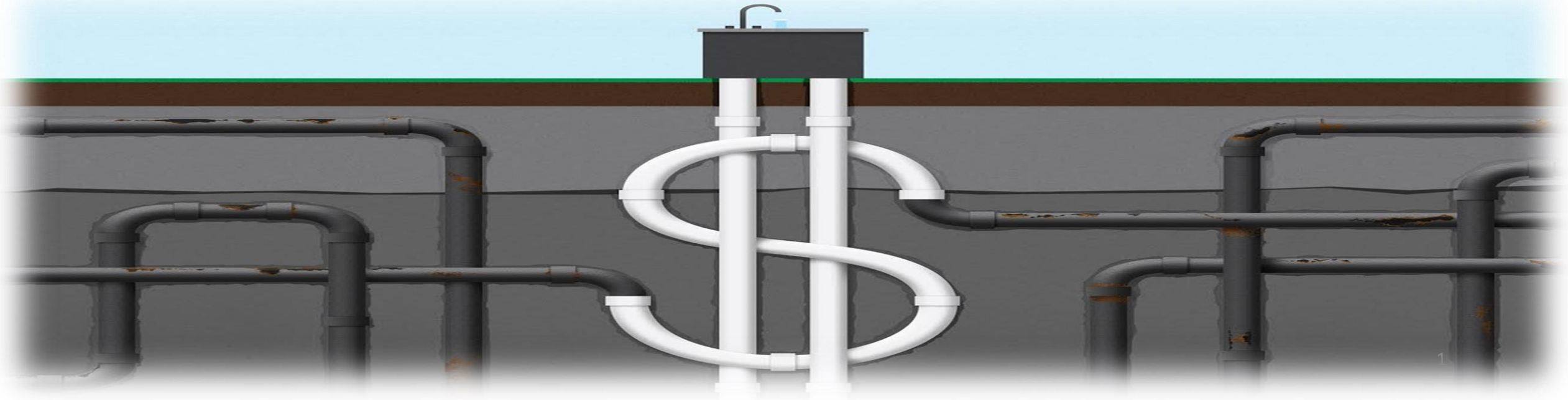


Regulators' Preferences and Underinvestment in Water Infrastructure

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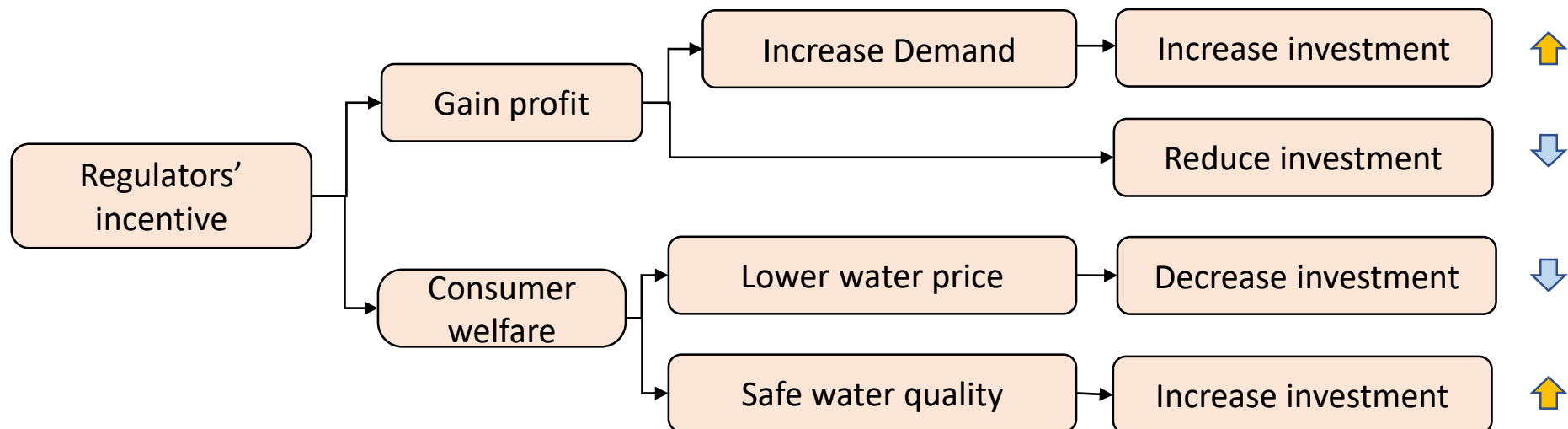


Background

- 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:

$$V(s_{it}) = \max_{k_{it}, p_{it}} \{ \underbrace{v C S_{it}(p_{it}, s_{it})}_{\text{Welfare of tax-payers, measured in terms of their surplus from water consumption}} + \underbrace{(1 - v) \pi_{it}(p_{it}, s_{it}, k_{it})}_{\text{Profits from operation (assuming it offsets the tax burdens)}} + \underbrace{\beta E[V(s_{it+1}) | s_{it}, k_{it}]}_{\text{Being able to supply water at a investment level in the future}} \}$$

- State Transition function:

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

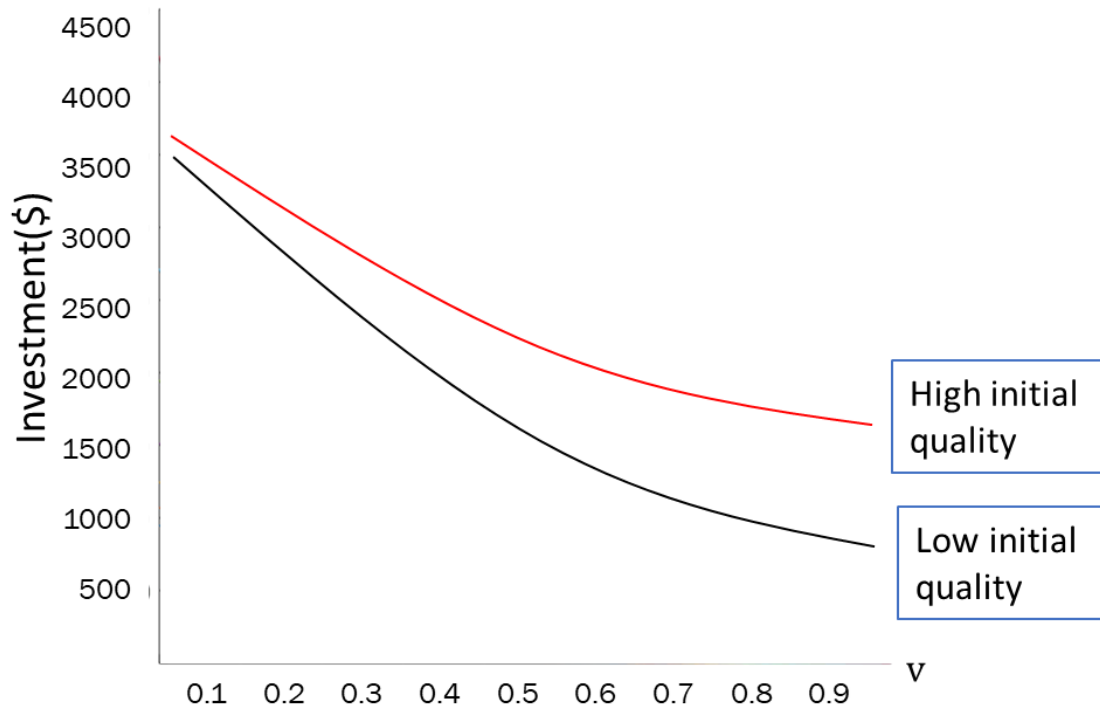
p_{it} : marginal price charged per thousand gallons of water in year in city i in year t;

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: $v = 0.77$ -- 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.