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XIX WORLD WATER CONGRESS
International Water Resources Association (IWRA)
Marrakech, Morocco | 1 - 5 December 2025

Kingdom of Morocco
Ministry of Equipment and Water

ELECTORAL INCENTIVES AND TRUST IN WATER UTILITIES AS DRIVERS OF LOCAL GOVERNMENT PARTICIPATION IN PERFORMANCE-BASED FINANCING PROGRAM: EVIDENCE FROM INDONESIA

Silvia Landa
University of North Carolina at Chapel Hill
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Motivation

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Funding challenges in extending piped water to low-income households

• Global spending on water and sanitation reached **USD 164.6 billion (2017 prices)**, yet achieving the SDG 6 targets by 2030 **requires an additional USD 131–141 billion annually, nearly three times current levels** (Joseph et al., 2024).

Private funding remains limited

• In 2017, **only 9 percent came from private sources** (Joseph et al., 2024).

• In many low- and middle-income countries, public utilities lack creditworthiness to attract private capital, keeping **governments and donors as the main financiers** (Advani, 2012; Alaerts, 2019; Kolker et al., 2016).

Motivation

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Corruption and mismanagement persist

- The water sector often fails to use allocated funds efficiently, **almost 25 percent of planned funds remain unused**, reflecting limited absorptive capacity (Joseph et al., 2024).
- **Roughly 10 percent of water resources are lost to illicit practices**, equivalent to USD 75 billion annually, raising connection costs by up to 30 percent (Das et al., 2016).
- Documented cases include **bribery in Uganda, utility mismanagement in Indonesia, and illegal water-rights trading in Mexico** (Jenkins, 2017; López Porras et al., 2019; Simbolan and McIntyre-Mills, 2019).

Motivation

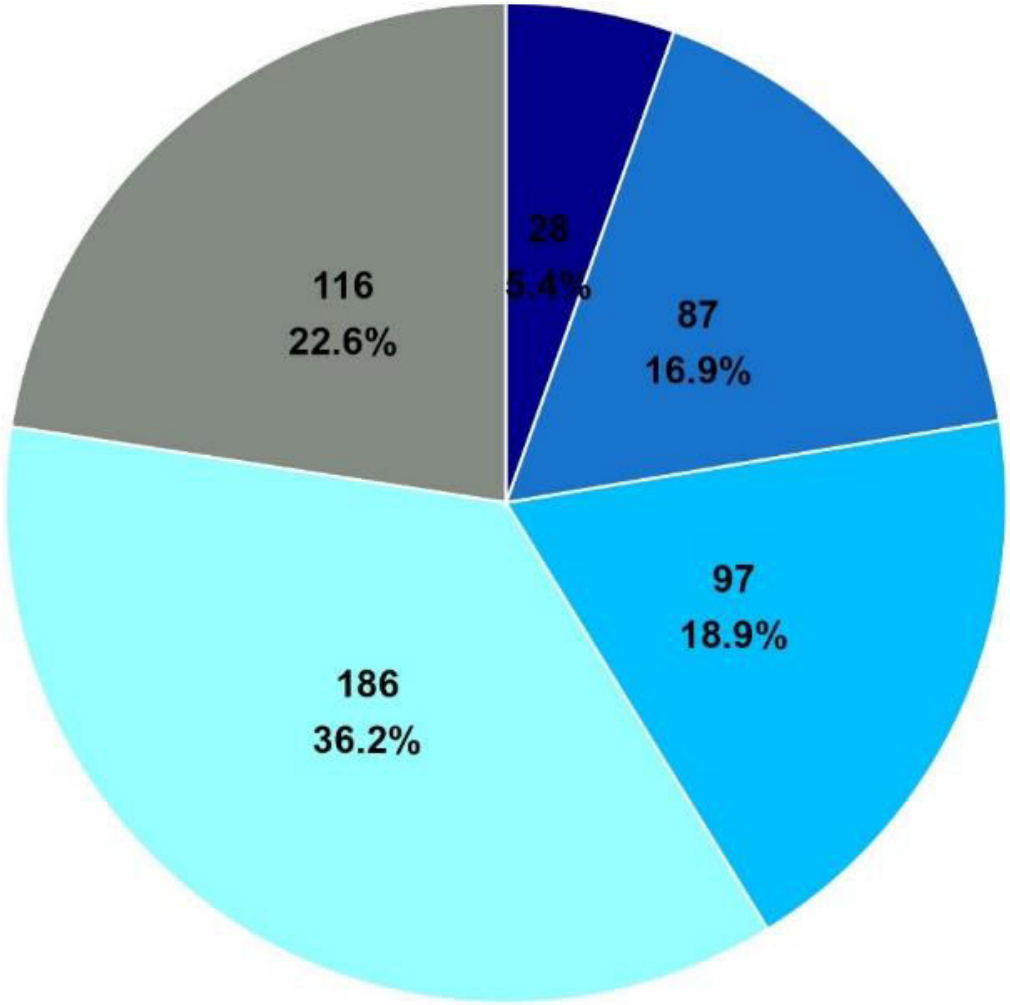
Performance-Based Financing (PBF) as a potential remedy

- PBF links disbursements to verified results, aligning local incentives with measurable service outcomes and reducing principal–agent problems.
- However, little is known about why local governments participate in such schemes.
- Existing research is scarce, so this paper contributes empirical evidence using Indonesia's Water Hibah program as a case study.

Motivation

Water Hibah a PBF case study from Indonesia

- National transfer through a reimbursement system to help local governments expand piped-water access for low-income households.
- Participation is low.



Hypotheses

“Political Will” → Electoral incentives

Baseline (non-interaction)

- H-A1: First term advantage. Districts led by first term, re-eligible mayors are more likely to participate than districts led by term-limited second term mayors.
- H-A2: Competitiveness. Districts with close prior elections are more likely to participate.
- H-A3: Timing. Participation is higher in pre-election periods.
- H-A4: Shock salience. Recent floods or droughts are associated with higher participation.

Hypotheses

“Political Will” → Electoral incentives

Interactions

• H-A2-Int: First term and competitiveness. The first term advantage is larger where the prior race was close.

• H-A3-Int: First term and pre-election period. The first term advantage is larger in pre-election periods.

• H-A4-Int: First term and shocks. The first term advantage is larger where recent floods or droughts occurred.

Hypotheses

Trust via Investment risk

• H-B1: Utility performance. Districts with higher water utility performance are more likely to participate and to persist.
• H-B2: Risk moderated politics. The electoral incentive to participation is larger where water utility performance is higher.

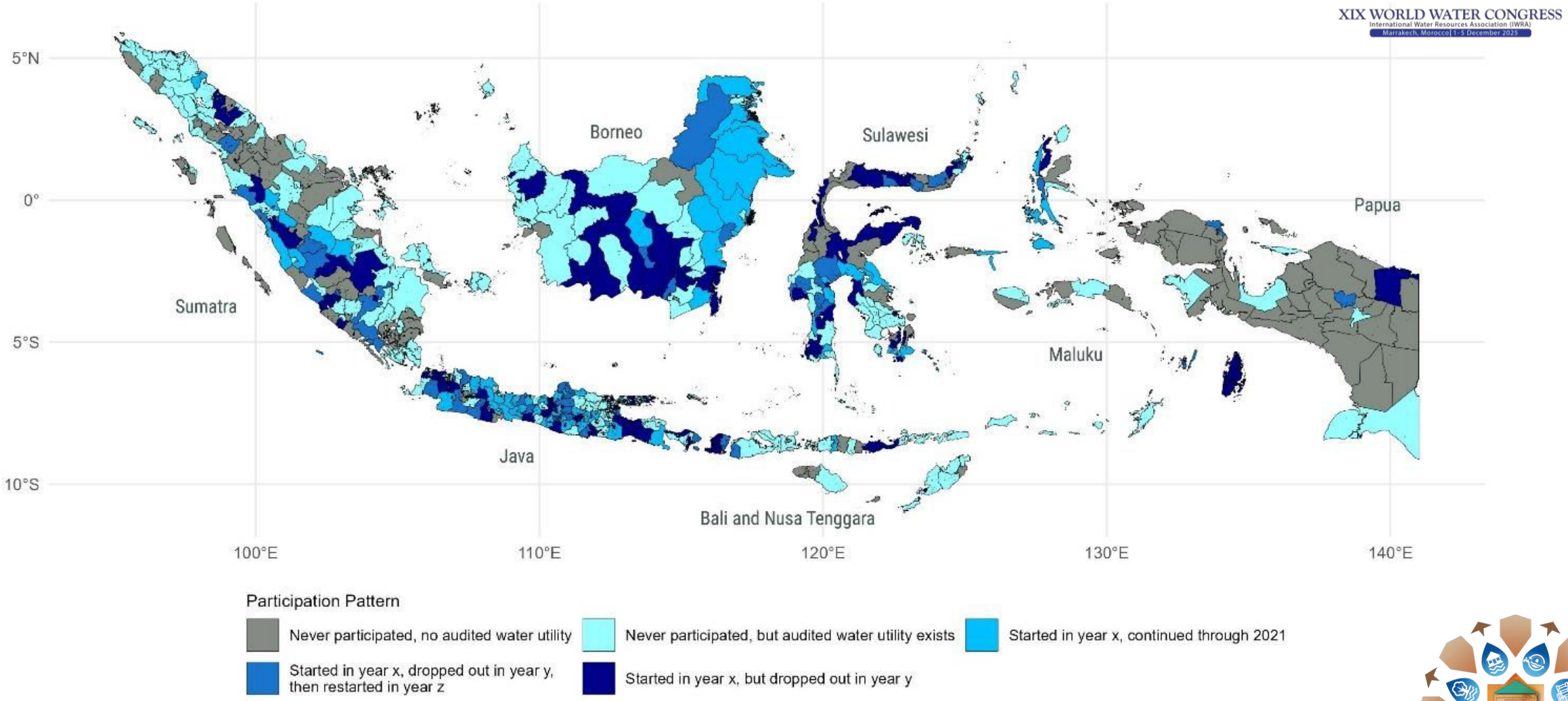
Dynamic participation

• H-C1: Persistence. Districts that participated last year are more likely to participate again this year.
• H-C2: Entry versus persistence. The determinants of entering the program may differ from the determinants for staying.

Other Factors

- Fiscal space, poverty rate, Gini ratio, total national transfers, and specific national water transfers
- Population size, urban status
- Utility service and capacity
- Spatial diffusion – neighboring effect

Data and Methods



Data and Methods

- **District-year panel dataset**
  - Covariates: 2014-2020
  - Water Hibah participation: 2015-2021
  - One-year lag reflects the cycle from budgeting (t-1) to implementation and reimbursement (t)

- **Sample**
  - From 514 districts/cities, retained 379 with district-owned water utilities
  - Each district observed for 2-7 years

Data and Methods

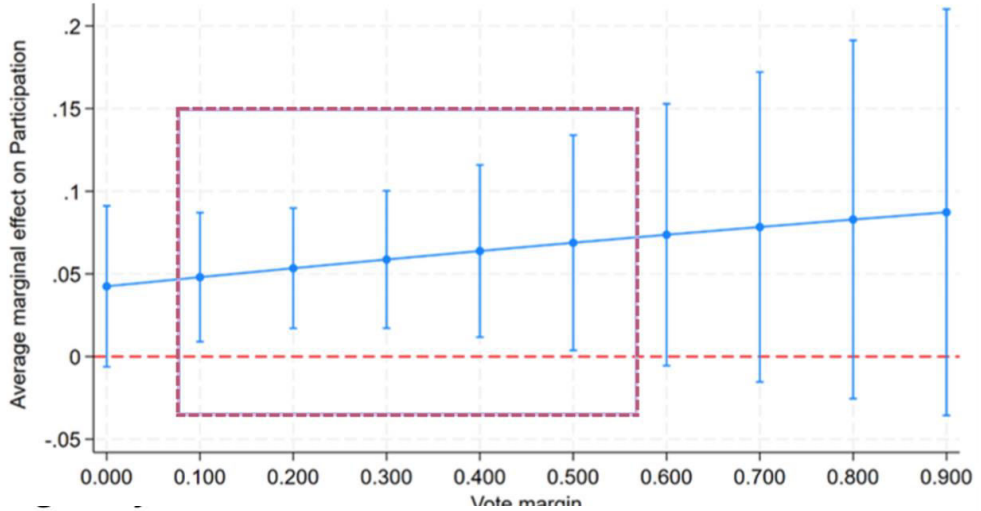
- **Modeling approach**
  - Used a **dynamic random-effects probit** model to capture state depen and allow analysis of **entry, continuation, or exit** behavior
  - Two-step system GMM to address endogeneity as robustness
- **Interaction tests**
  - Using **graph** to present average marginal effects with confidence interval Norton, 2003)

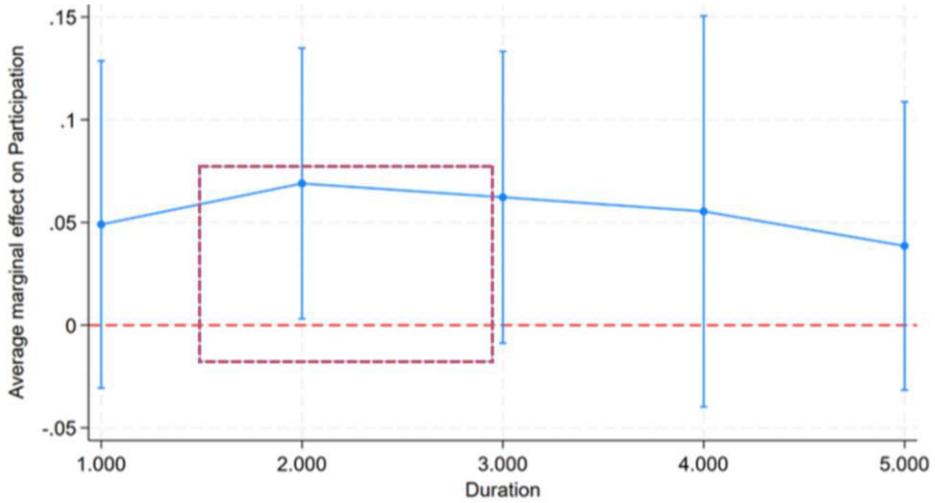
Findings

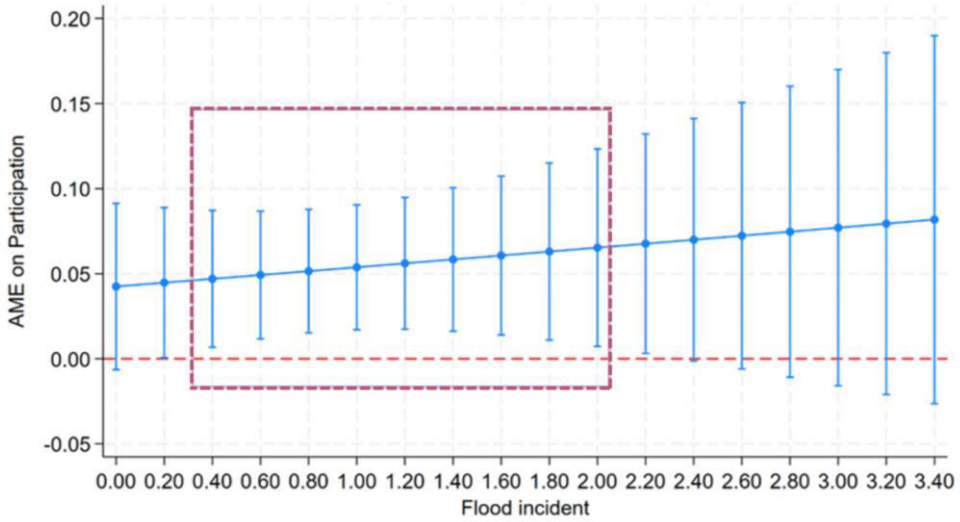
- **Do politics influence participation?**
  - At baseline, Only the **first-term effect matters**: re-eligible first-term mayors are +28.6 pp (s.e. 10.1 pp, $p < 0.01$) more likely to participate.
  - No evidence of influence from **tight races, pre-election cycles, or baseline disaster shocks.**
- **Does investment risk influence participation?**
  - At baseline, **Non-Revenue Water (NRW) is the key risk factor**: +10 pp in NRW → –17 pp participation.
  - Other indicators (OCCR, service hours, customer base) not significant at baseline.

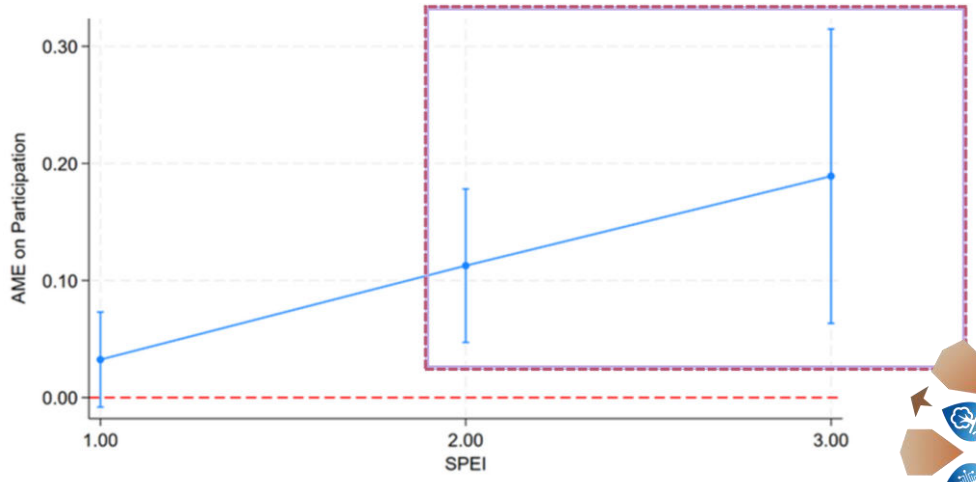
Findings ~ Politics

- **Heterogeneity of first-term effect**



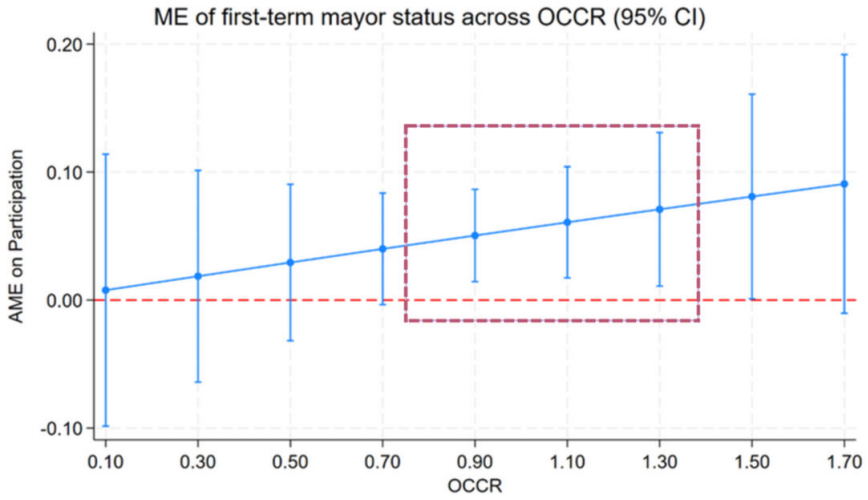


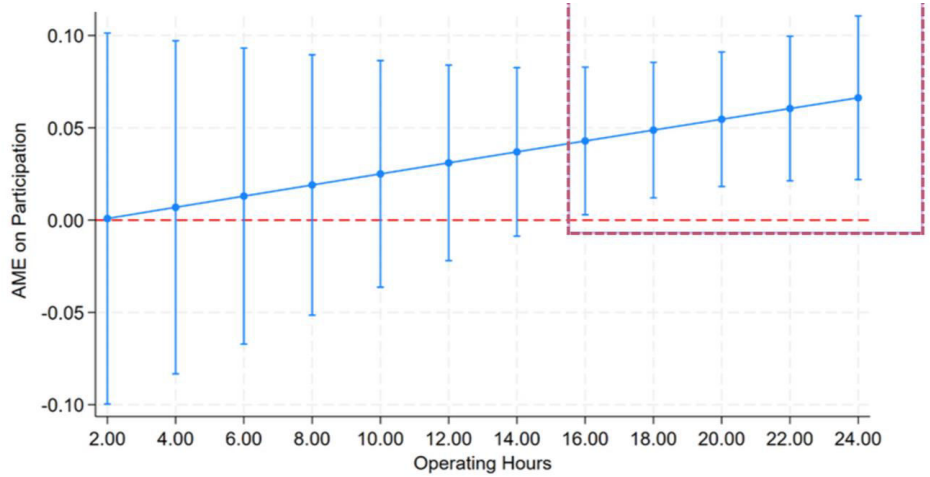


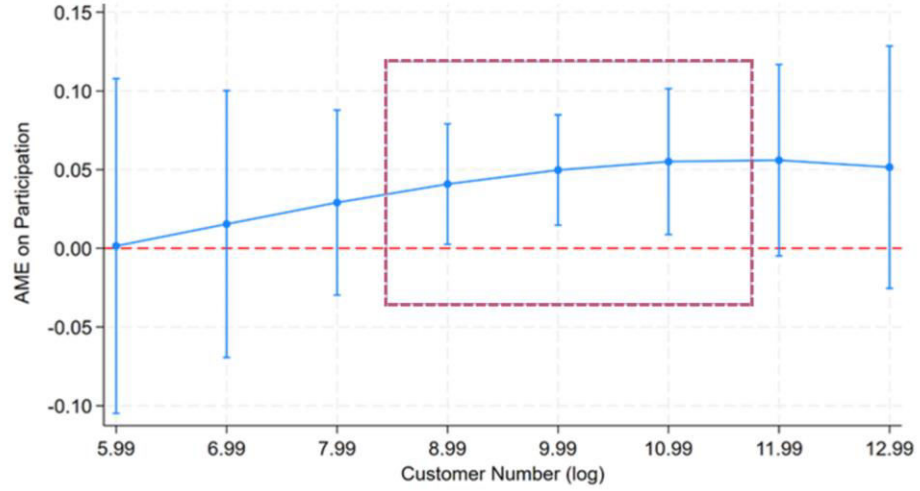


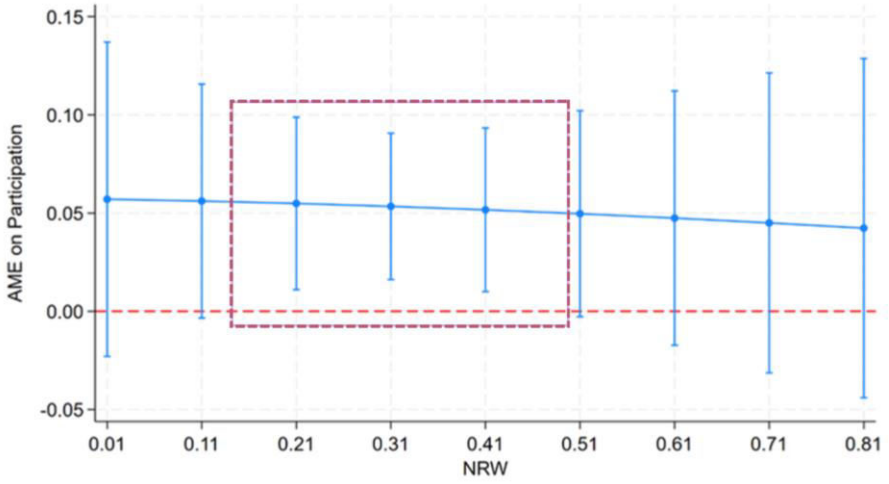
Findings ~ Politics x Investment Risk

- **Water utility performance as a moderator of the first term effect**









Findings

- **Dynamics and diffusion**
  - Strong state dependence: **past participation** increases current uptake (+20.7 pp).
  - **Neighboring participation** promotes uptake (+8.4 pp per 10-point increase).
  - **Same determinants drive both entry and persistence**, though effects are stronger for persistence.

Interpretation

- **Electoral incentives** (highest at 28 pp) operate mainly through a **first-term** advantage;
  - first-term mayors appear to respond differently to droughts versus floods.
- Investment risk, proxied by utility performance, at baseline, only (10 pp) **higher NRW (Risk) → Lower Participation (17 pp)**
- **Risk and politics interact: participation** is most likely when **risk is moderate** (e.g., mid-range NRW, an Operating Cost Coverage Ratio near one) and **potential gains are salient** (e.g., a mid-sized customer base) for **first-term incumbents.**
- Uptake also exhibits **dynamic persistence**, and participation by **neighbors** is positively associated with one's own uptake.

Policy Recommendation

- **Reducing NRW** by 10 pp is linked to +17 pp participation, equal to ~60% of the first-term effect.
- Target the **"sweet spot"** for uptake
  - Focus on re-eligible first-term mayors in **moderate-risk** districts (NRW 20–40%, OCCR ≈1).
  - Align incentives where risk and visibility allow credible achievement signaling to voters.
- Leverage dynamics and peer learning
  - Prioritize first entry: early participation increases persistence.
  - Promote provincial peer learning to diffuse feasible playbooks.

Study Limitation and Future Research

Interpret findings with caution

- Results are associative, not causal: unobserved local factors may remain.
- Key variables (e.g. NRW, OCCR, flood data) are partly self-reported and water utility indicators do not cover all aspects of performance.
- In nonlinear models, averages may mask heterogeneity, and our heterogeneity assessment does not capture all potential variations.
- Generalizability is limited to the Indonesian context and similar performance-based financing mechanisms

Future Study:

- The underlying theory can be tested and validated in other setting
- Use causal inference methods where possible.
- Explore linkages between contexts ~ policy design ~ actors

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Thank you!

slanda@unc.edu

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Data and Methods

Variable	Definition	Coding / scale
Utility serves outside its district	Water utility serves customers outside its home district.	Binary: 1 = yes; 0 = no
Neighboring effect	Share of other districts in the same province participating in year t (excludes focal district).	(number of participating districts in province at t -1 exclude excludes the focal district) / (number of districts in province excludes the focal district)

Data and Methods

Variable	Definition	Coding / scale
Water Hibah participation	District receives a Water Hibah reimbursement in year t.	Binary: 1 = participate; 0 = otherwise
Term status (H–A1: First-term advantage)	Executive term status.	Binary: 1 = first term (re-eligible); 0 = second term (term-limited) or caretaker/acting mayor as reference
Victory margin (H–A2: Competitiveness)	Absolute vote-share difference between winner and runner-up in the last mayoral/regent election.	Proportion
Years in office (H–A3: Timing)	Duration in office in the current five-year term.	Categorical indicators for years 1–5, year 2 as reference
Flood events (log1p)(H–A4: Shock salience)	Count of flood incidents in year t transformed as log1p(x) = ln(1 + x).	log1p transformation (handles zeros)
SPEI index (H–A4: Shock salience)	Standardized Precipitation–Evapotranspiration Index (SPEI), discretized into drought severity.	4 = extreme (−∞, −2); 3 = severe [−2, −1.5); 2 = moderate [−1.5, −1); 1 = no/mild [−1, ∞), SPEI =1 as reference

Data and Methods

Variable	Definition	Coding / scale
Number of customers (log) (H–B1: **Utility performance)**	Service-connection units.	Natural log
Operating Cost Coverage Ratio (OCCR) (H–B1)	Operating revenue divided by operating expenses (full cost coverage at ≥ 1).	Ratio
Service operation hours (H–B1)	Water distribution time during the evaluation period.	Hours per day
Non-Revenue Water (NRW) (H–B1)	[(Distributed - Billed Water (m^3))/Distributed Water (m^3)] x100%	Proportion

Data and Methods

Variable	Definition	Coding / scale
Poverty rate %	Share of residents below the national poverty line.	Percent (%)
Gini ratio	Income inequality index.	0–1 (higher = more unequal)
Religious fractionalization [informal institution]	Herfindahl-type diversity across faiths (higher = more fractionalized).	0–1
Population (log)	District population.	Natural log
GRDP per capita (log)	Gross Regional Domestic Product per capita (including oil and gas), constant 2008 IDR (thousand).	Natural log
Municipality	Administrative status. Municipality is more urban than regency.	Binary: 1 = municipality (kota); 0 = regency (kabupaten)

Data and Methods

Variable	Definition	Coding / scale
Special Water Fund (log)	Specific Allocation Grant for the water infrastructure sector (DAK Air), IDR thousand.	Natural log
Total Special Fund per capita (log) [national favoritism]	Total Specific Allocation Fund transfers per capita.	Natural log
Distance to national capital (km)	Distance from center of the district to the center of Central Jakarta as the capital.	Kilometers (in thousand)
Employees per 1,000 customers	Staff intensity.	[Employees / 1000] / Customers