

Determinants of Contractual Choice in Public-Private Partnerships in India's Water Sector

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Presented at the Department of Civil Engineering, IIT Madras, Chennai on Sep 24, 2013

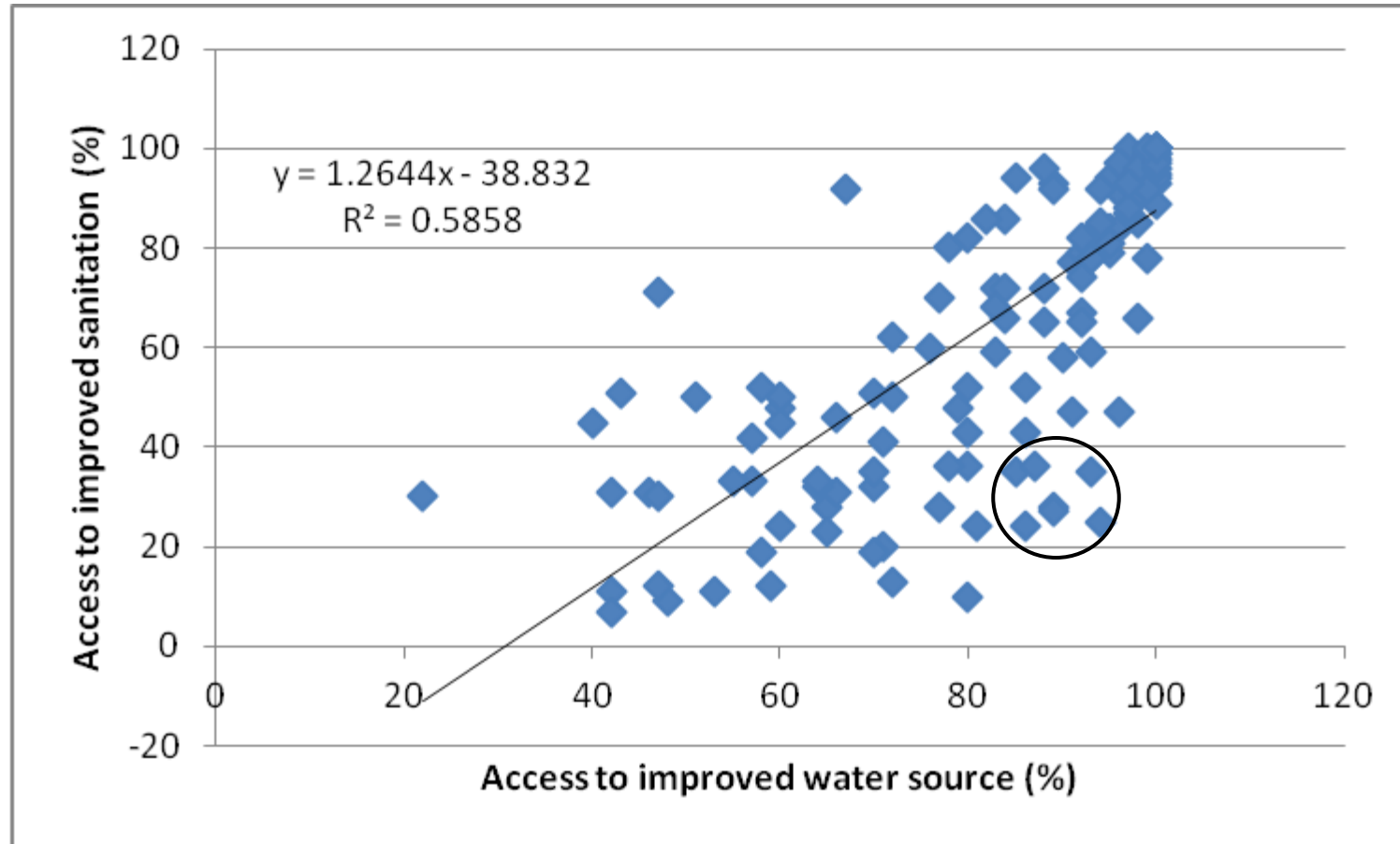
Perspectives

“The slogan of ‘bijli, sadak, pani’ is passé; virtual things like UID number, bank account and mobile phone are the in-thing.”

“Whilst I realized the grandeur of the holy Ganga and the holier Himalayas, I saw little to inspire me in what man was doing in this holy place. To my great grief I discovered insanitation both moral and physical ... Thoughtless ignorant men and women use for natural functions the sacred banks of the rivers where they are supposed to sit in quiet contemplation and find God. They violate religion, science and laws of sanitation.”

The Hindu, 2010 & The Young India, 1929

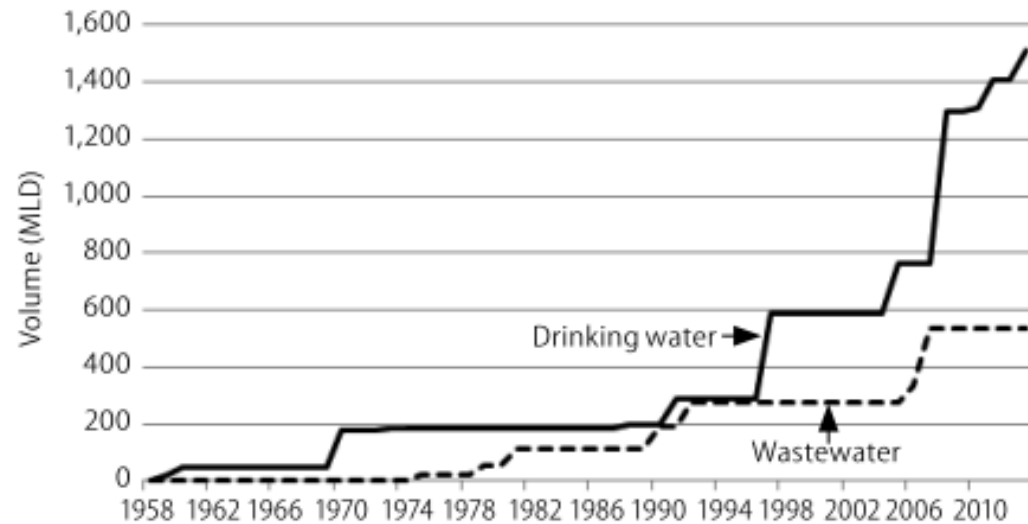
Water & Wastewater Infrastructure in India



Water & Wastewater Infrastructure in India

- Intermittent drinking water supply
- Poor quality control
- Severe lack of wastewater treatment capacity

Figure 1: Treatment Capacity for Drinking Water and Wastewater in Chennai



Source: CMWSSB.⁶

THE HINDU

CITIES » CHENNAI

CHENNAI, April 2, 2013

Three more sewage treatment plants for Chennai

STAFF REPORTER

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WaSH Impacts

- Historical international evidence on reduced mortality
 - Baltimore (1915), Am. Indian Reservations (1970s), Argentina (1990s)
- Gender and caste imbalances
- Increase in writing ability at school
- Possible explanation of the “Asian enigma”

Sanitation Score Index

- Released by Ministry of Urban Development
 - Building upon the National Urban Sanitation Policy
- Covered 423 cities (72% urban national population)
- Focus on outcome and process over output
- Basis for awarding *Nirmal Shahar Puraskar*

Sanitation Score

$$y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \epsilon$$

| Variable | | N | Min | Max | Mean | Std. Dev |
|-----------|---|-----|--------|---------|---------|----------|
| INCPERCAP | + | 428 | 17064 | 148136 | 47735 | 19797 |
| OWNASSET | + | 427 | 0.4 | 28.6 | 5.29 | 5.13 |
| POP | + | 421 | .0137 | 11.978 | .437 | .993 |
| POPSQ | - | 421 | 189.04 | 1.43e08 | 1175309 | 9468054 |
| LIT | + | 399 | 49.51 | 98.8 | 85.47 | 6.16 |
| TFR | - | 426 | 1.2 | 4.9 | 2.45 | 0.83 |
| TOILET | + | 427 | 11.3 | 98.9 | 53.87 | 23.73 |

Sources: MoUD (2010), Economic Survey (2012),
Census of India (2011)

PPPs

- Private delivery experience
- PPPs break the pure-public/pure-private debate
- Associated with increased coverage and lower mortality
- Increased use of P3s in the last decade

Types of contract

| Contract | Water | Wastewater | Total |
|----------------------------|--------------|-------------------|--------------|
| Management contract | 8 | 25 | 34* |
| Design-build | 1 | 1 | 2 |
| BOT | 44 | 50 | 95* |
| DBFO | 1 | 6 | 7 |
| <i>Observations</i> | 54 | 82 | 138 |

*Includes 2 projects, one each under management contract and BOT that were classified as integrated water and wastewater projects.

Private Involvement and Risk Transfer

| Contract | Private involvement | Risk transfer |
|----------------------------|----------------------------|----------------------|
| Management contract | 1 | Very low |
| Design-build | 2 | Low |
| Concession/BOT | 3 | High |
| DBFO | 4 | Very high |

Contractual Choice

$$y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \epsilon$$

| Variable | | N | Min | Max | Mean | Std. Dev |
|-----------|--------|-----|-------|---------|---------|----------|
| CONTRACOV | + | 124 | 5 | 766187 | 15173 | 84101 |
| P3INFRA | + | 162 | 9.4 | 83.7 | 52.86 | 19.03 |
| SANSCORE | - +/ - | 144 | 21.58 | 73.48 | 40.98 | 9.53 |
| NATPARTY | - + | 145 | 0 | 1 | 0.85 | 0.35 |
| POP | + | 155 | .025 | 18.41 | 4.51 | 5.86 |
| POPSQ | + | 155 | 625 | 3.39E08 | 5.45E07 | 1.00E08 |
| WWATER | | 163 | 0 | 1 | 0.42 | 0.53 |
| YEAR | + | 145 | 1999 | 2012 | 2009 | 2.6 |

Results and Conclusions

- Social norms and institutions shape our attitudes and actions on sanitation
- Rapid urbanization forces new and quick solutions
- Our metros are too large to govern and provide adequate services
 - Prudent to focus on medium and small cities
- P3s an opportunity to fix decades of inaction
- Sanitation score is a strong determinant of PPP contractual choice
 - Role of party control and governance

Contact

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Sanitation Score Results

| Variable | SANSCORETOT | SANSCOREEXT |
|----------------|------------------------|------------------------|
| INCPERCAP | 5.24e-6 (0.19) | 5.04e-7 (0.02) |
| OWNASSET | 0.175 (1.03) | 0.11 (0.81) |
| POP | 6.28*** (4.29) | 5.37*** (4.28) |
| POPSQ | -5.98e-7 (-4.13)*** | -4.96e-7*** (-3.93) |
| LIT | 0.40*** (5.53) | .42*** (6.41) |
| TFR | -1.90*** (-2.67) | -1.33** (-2.04) |
| TOILET | .002 (0.10) | 0.01 (0.60) |
| N | 398 | 398 |
| F-state (prob) | 36.37 (.000) | 29.41 (.000) |
| R ² | 0.32 | 0.32 |

PPP Contractual Determination Results

| Regressors | Ordered Logit | Binary Logit |
|----------------------|----------------------|---------------------|
| CONTRACOV | -5.97 e-7 (-0.34) | 1.13e-6 (0.44) |
| P3INFRA | .03** (2.37) | .05** (2.47) |
| SANSCORE | -.08* (-1.79) | -.09** (-2.36) |
| NATPARTY | -1.77** (-2.04) | -2.44* (-1.80) |
| POP | -.26 (-1.49) | -.38 (-1.59) |
| POPSQ | 1.93e-8** (2.06) | 2.92e-8* (1.93) |
| WWATER | .002 (0.00) | .48 (0.78) |
| YEAR | .14 (1.55) | .07 (0.61) |
| N | 102 | 102 |
| Chi-sq (prob) | 15.00 (0.06) | 17.28 (0.027) |
| Log pseudolikelihood | -71.41 | -46.37 |
| Pseudo-R2 | 0.11 | 0.18 |