Legal Reform and Investment Decisions in Public Utilities: Evidence from the Brazilian WS Sector

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Motivation

- Gov't provision of public goods is a first-order concern for economic and general well-being
- Large debate in the proper role for various levels of gov't in provision (Oates; 1999) (Hulten & Schwab; 1997)
  - Central Gov't $\rightarrow$ Economies of Scale, Spillovers
  - Local Gov't $\rightarrow$ Knowledge and response to local conditions

Motivation

- Debate assumes that the responsible level of gov't is clearly defined
- Few studies on situations where ambiguity in responsible level exists
  - Legal infrastructure not sufficiently developed
  - Uncertainty in residual rights of control

Question

- How does ambiguity in roles between gov't affect investment in public goods provision?
  - Theoretical framework: Ambiguity $\rightarrow$ threat of expropriation $\rightarrow$ sub-optimal investment
  - Reform that clarifies roles should increase investment in public utilities

Identification

- Look at the Brazilian water and sewerage (WS) sector:
  - Unique legal and organizational structure
    - ★ Self-run vs state-run WS service in municipalities
  - Bills proposed in Congress in 2001 and 2005 to clarify the level of government with the authority of WS provision
- Can estimate the effect that the new legal structure had on the investment decisions of firms in the municipal WS sector

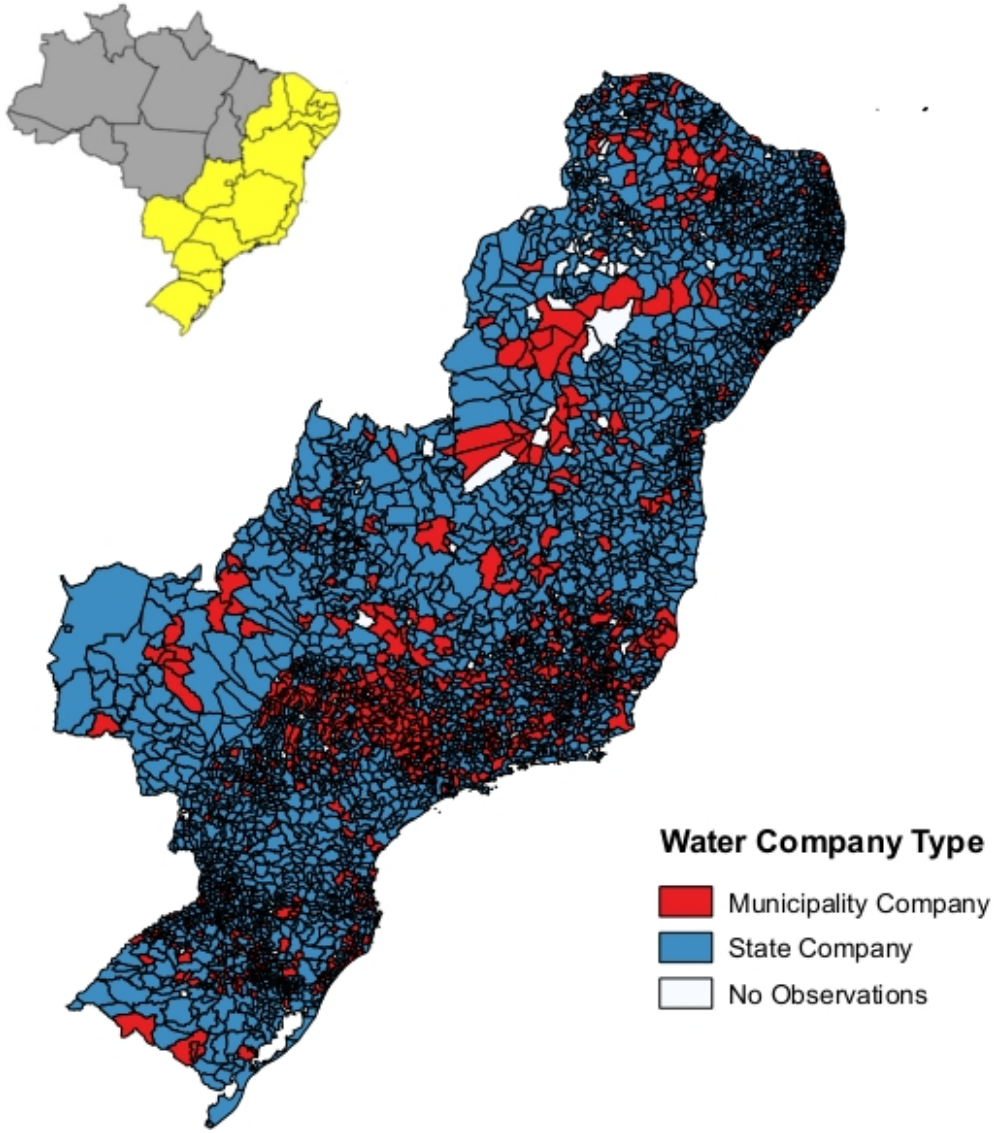
Preview of Results

- Post-legislation, self-run municipality WS companies:
  - Almost doubled total investment from pre-reform levels
  - Increased investment funded by **debt** and **self-financing**
  - Significant increases in investment in all aspects of network (water, sewer, misc.)
- 3 years later, significant increase in water and sewer access
  - More metered water connections, total sewer connections, sewer network length

Institutional Context

- 1960's: Municipal provision of WS services
- 1971: National Sanitation Plan (PLANASA)
  - Creates 25 state-wide companies (CESBs)
  - Approximately 70% of municipalities contracted with CESBs
- Unclear legal arrangement on relationship between state and municipality $\rightarrow$ threat of expropriation by CESBs

Municipality by Type of Water Company



Institutional Context

- Legislation in mid-2000s to reform WS sector:
- Bill 4.147/2001:
  - Proposed in Congress in 2001
  - Control to States $\rightarrow$ expropriate self-run WS companies
  - Faced stiff opposition; failed to pass committee
- Bill 4.926/2005:
  - Reaction bill proposed in Congress in 2005
  - Control to municipalities $\rightarrow$ residual rights of control & authority
  - Passed Congress in January 2007 at National Water Law 11.447

Empirical Strategy

- Failure of Bill 4.147/2001 and the subsequent passage of Bill 5.926/2005:
  - Clarified roles of different levels of gov't in the WS sector
  - Eliminiated threat of expropriation by state WS companies
  - Strengthened the "property rights" of the self-run municipalities
- Use the proposal of Bill 5296/2005 in a Diff-in-Diff framework:
  - Compare investment levels in municipality WS networks
  - Self-run companies (treatment) vs state-run municipalities (control)
  - Investment level before and after legal reform

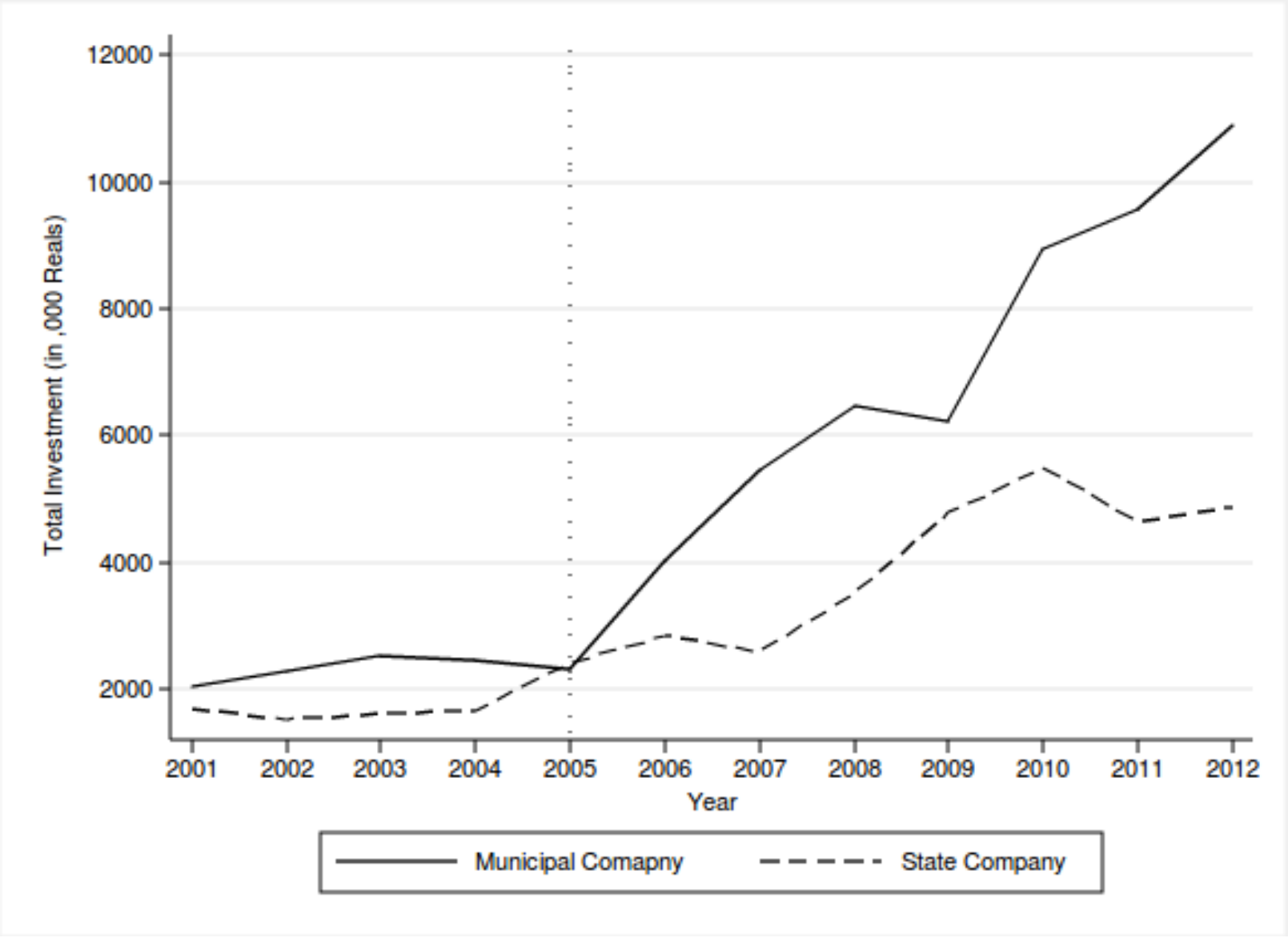
Data

- Main data source from the Ministry of Cities
- Annual panel dataset of Brazilian WS sector
  - Data disaggregated at the municipality level
  - Period of study: 2001-2012

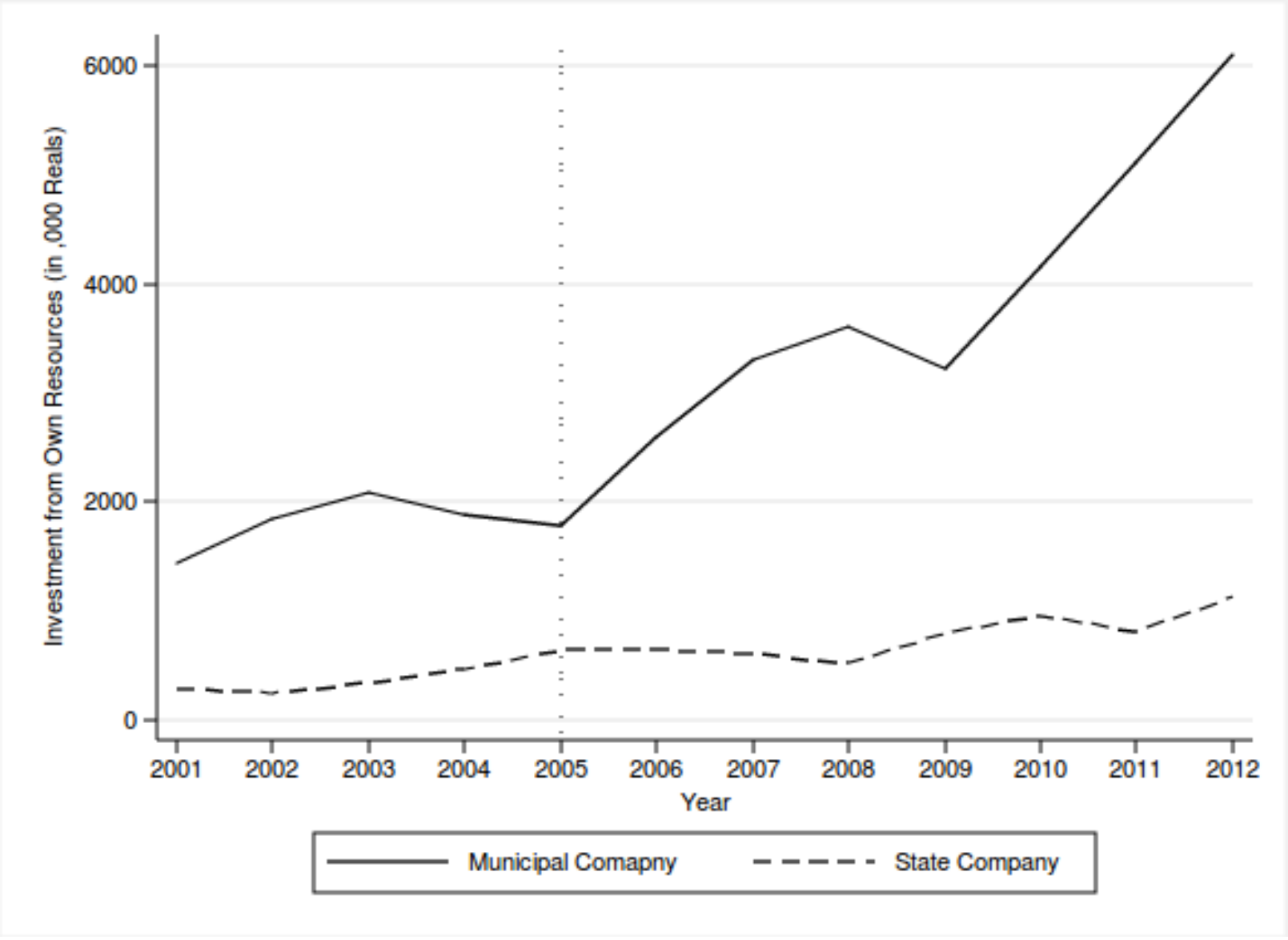
Data

- Eight investment categories:
  - Total investment
  - Source of investment:
    - ★ Own investment
    - ★ "Onerous" investment → Debt & bank loans
    - ★ "Nononerous" investment → Small gov't grants
  - Destination of investment:
    - ★ Investment in water network
    - ★ Investment in sewer network
    - ★ Misc. network investment (e.g. office space, computers)
    - ★ Capital Expenditure

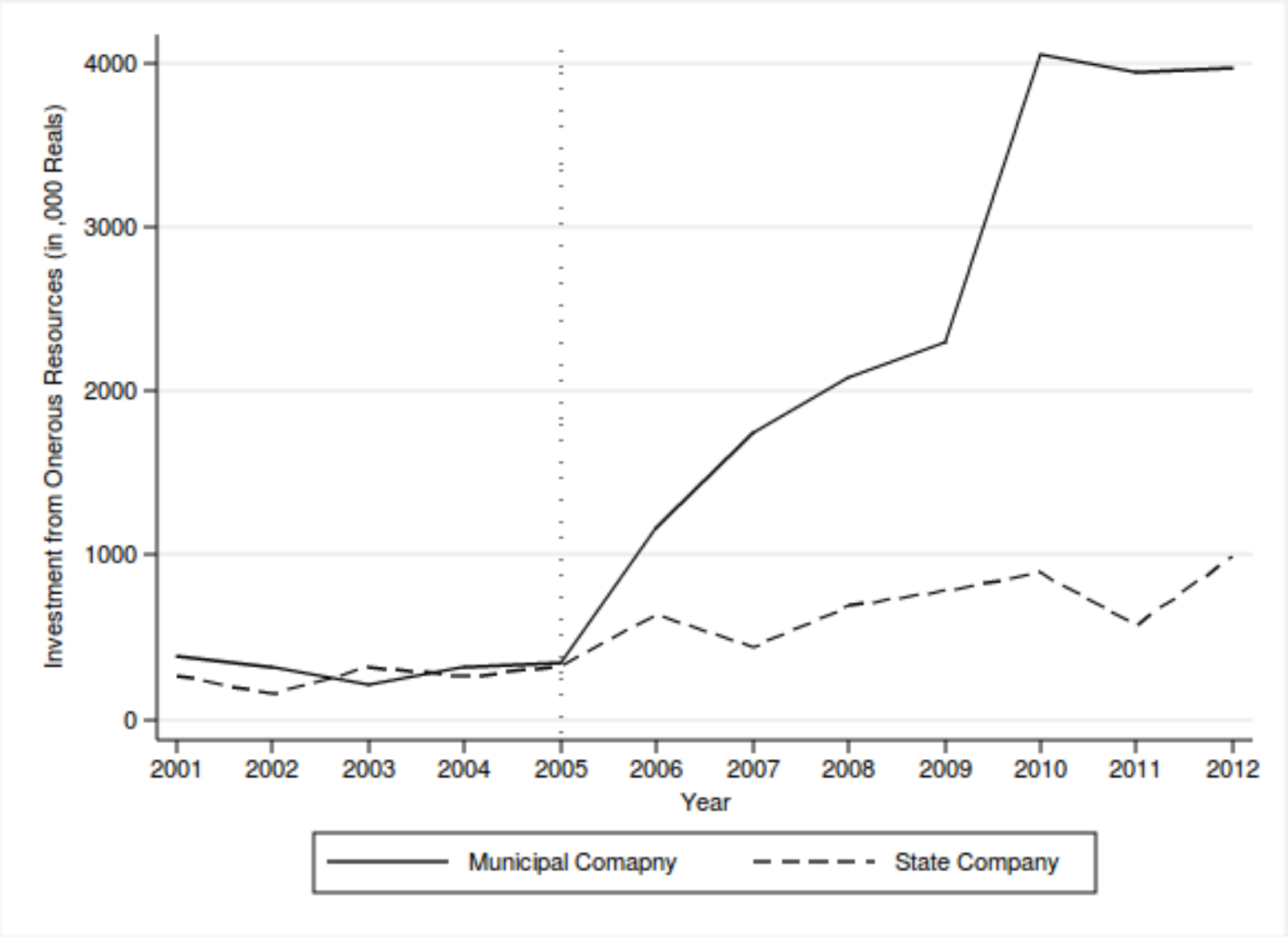
Results - Total Investment



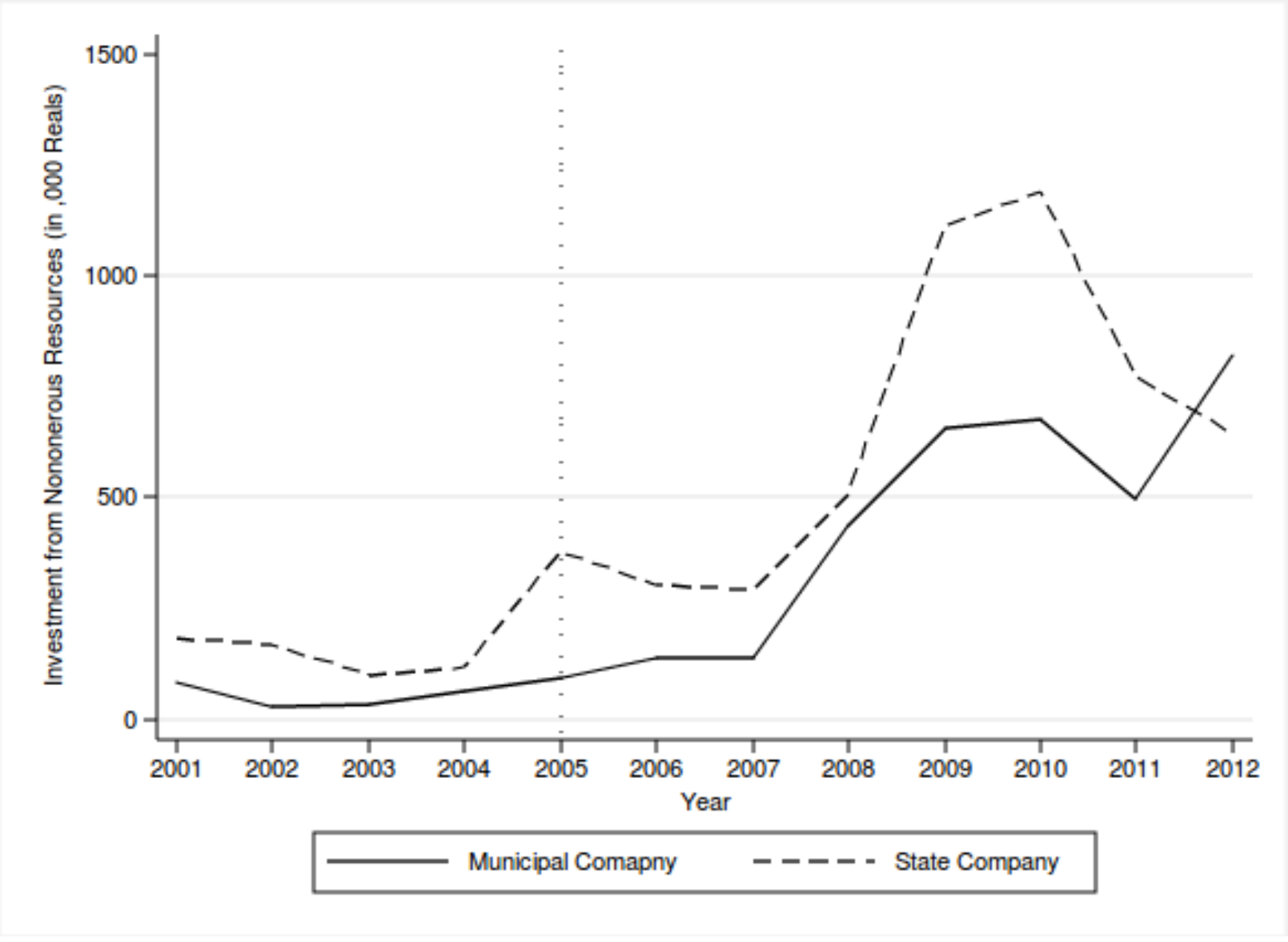
Results - Own Resources



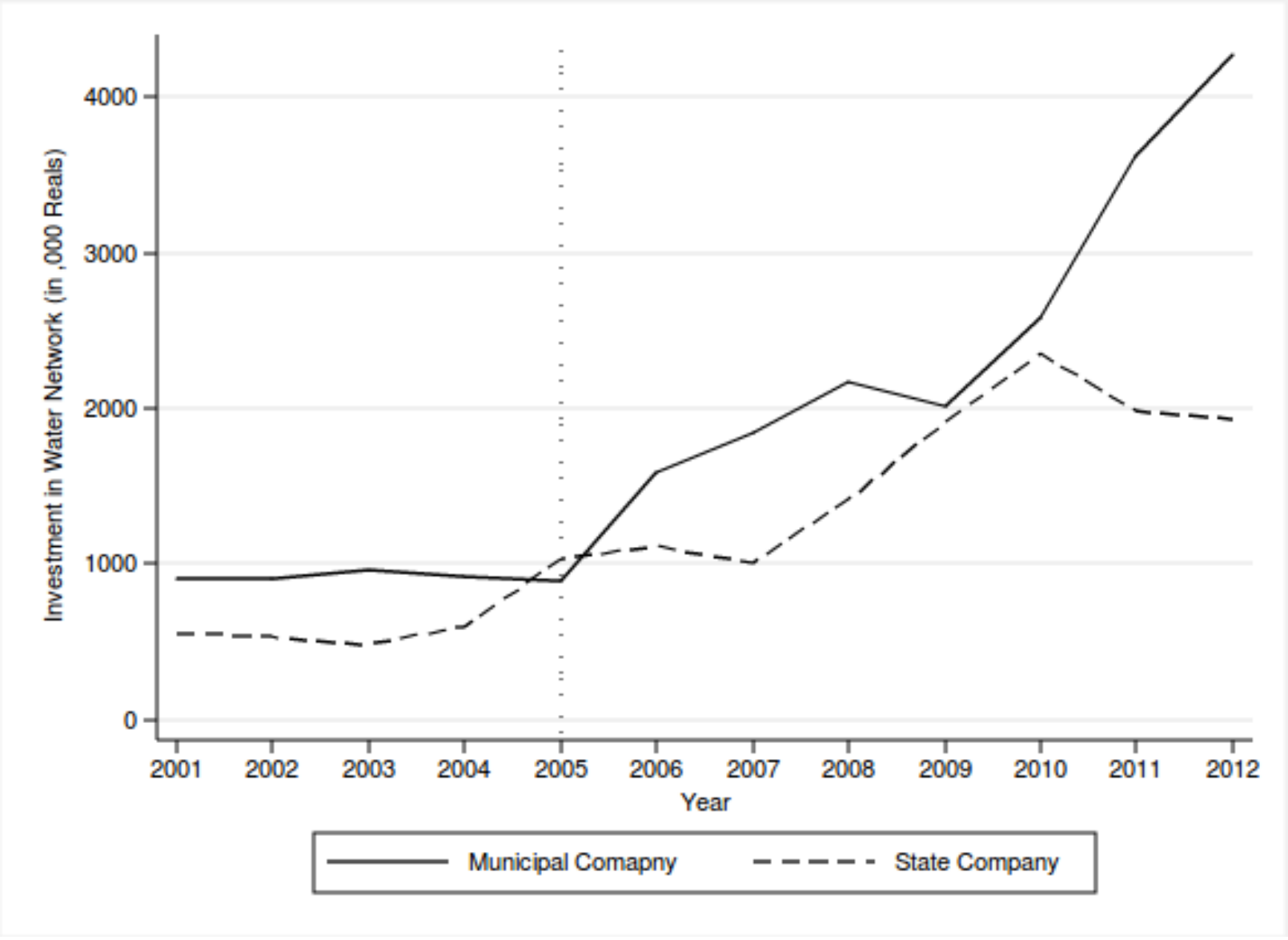
Results - Onerous Resources



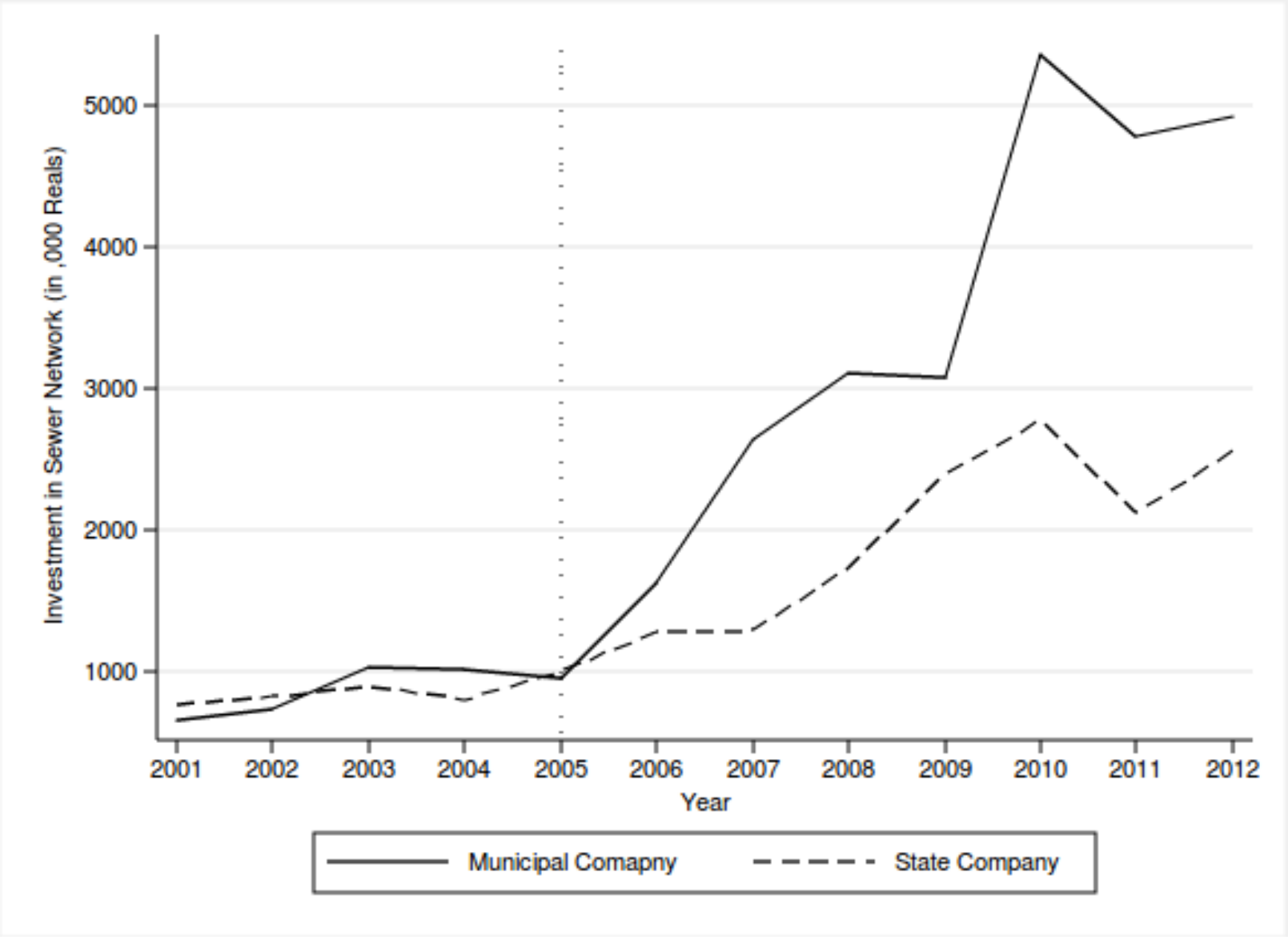
Results - Nononerous Resources



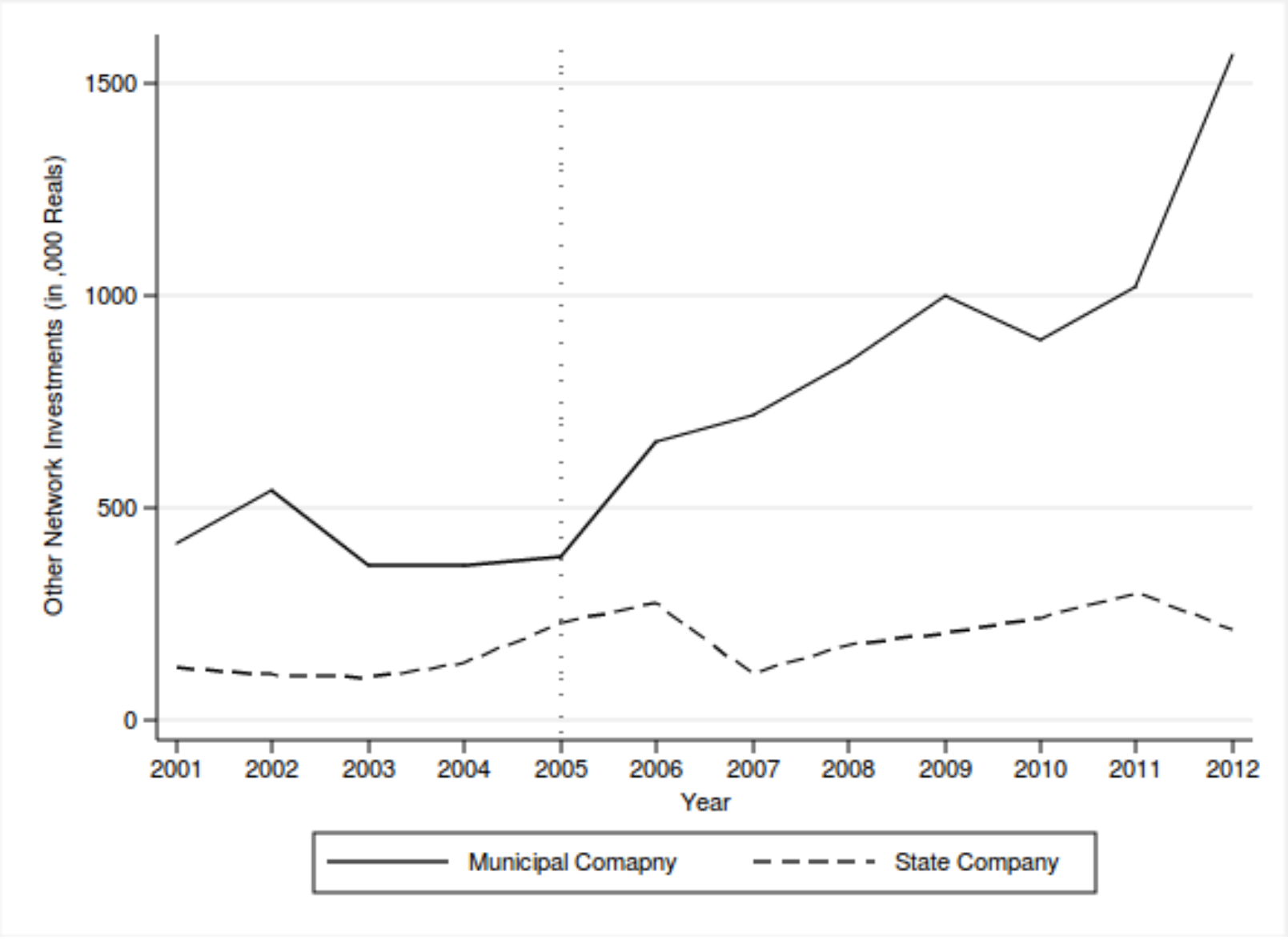
Results - Investment in Water



Results - Investment in Sewer



Results - Investment in Misc.



Empirical Strategy

- Use the proposal of Bill 5296/2005 in a Diff-in-Diff framework:

$$y_{mt} = \beta_0 + \beta_1 Bill_t + \beta_2 MuniCo_m + \beta_3 Bill_t^* MuniCo_m + \gamma_1 Z_{mt} + \delta_{FE} + \varepsilon_{mt}$$

- For municipality m in year t, where:
  - y_{mt} are various investments in WS system
  - $Bill_t = 1$ if the year is after when the law was proposed
  - $MuniCo_m = 1$ if municipality m's W&S system is run by a municipal company
  - Z_{mt} is a vector of control variables (population, gdp, gva, taxes, agricultural production, climactic conditions, base investment, etc.)
  - δ_{FE} are FE for year, state, and metro areas
  - ε_{mt} are clustered S.E. at the municipality level

Results

Table 1: WS Investment - Source

VARIABLES	(1) Total Investment	(2) Own Investment	(3) Onerous Investment	(4) Nononerous Investment
Municipal WSS	-1,827***	-377.4	-945.6**	-116.3
	(591.8)	(290.4)	(366.7)	(134.3)
Bill 5.296	290.2	71.04	103.6	10.70
	(235.1)	(99.85)	(159.6)	(80.57)
Municipal WSS * Bill 5.296	2,778***	1,313***	1,829**	-212.8
	(1,040)	(381.4)	(813.1)	(174.4)
Observations	9,655	9,655	9,655	9,655
R-squared	0.622	0.579	0.308	0.468
Year FE	Yes	Yes	Yes	Yes
State FE	Yes	Yes	Yes	Yes
Metro FE	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes

Results

Table 2: WS Investment - Destination

VARIABLES	(1) Investment in Water	(2) Investment in Sewer	(3) Other Investments	(4) Capital Expenditure
Municipal WSS	-283.9	-1,385***	-115.1*	-71.33
	(212.8)	(406.6)	(60.79)	(54.28)
Bill 5.296	74.54	119.6	-18.45	107.0**
	(129.4)	(164.2)	(23.59)	(48.54)
Municipal WSS * Bill 5.296	770.7**	1,492**	419.4***	32.82
	(321.2)	(748.5)	(124.8)	(74.10)
Observations	9,655	9,655	9,655	9,655
R-squared	0.480	0.515	0.390	0.245
Year FE	Yes	Yes	Yes	Yes
State FE	Yes	Yes	Yes	Yes
Metro FE	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes

Summary of Results

- Post-legislation, self-run municipality WS companies:
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Questions and Comments