

Transboundary Pollution and Municipal Investments into Wastewater Management

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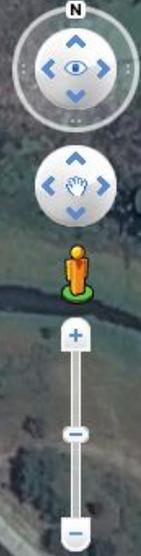
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PTAR El Salitre

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Outline

1. Motivation
2. Previous Studies
3. Conceptual Framework
4. Empirical Approach
5. Data and Empirical method
6. Results
7. Conclusions

Previous Studies and Contribution

Dependent variables	Studies
Pollution level (air, water, land)	<ul style="list-style-type: none">• Cai et al., 2016;• Grey et al. 2004
Environmental Water Quality	<ul style="list-style-type: none">• Sigman, 2002, 2005;• Limpscomb & Mobarack, 2017
Regulatory Actions	<ul style="list-style-type: none">• Cai et al., 2016;• Grey et al., 2004

Previous Studies and Contribution

Closeness criterion	Studies
Indicator	<ul style="list-style-type: none">• Kahn et al., 2015;• Sigman, 2002, 2005
Distance measure	<ul style="list-style-type: none">• Sigman, 2002, 2005;• Limpscomb & Mobarack, 2017• Cai et al., 2016

Previous Studies and Contribution

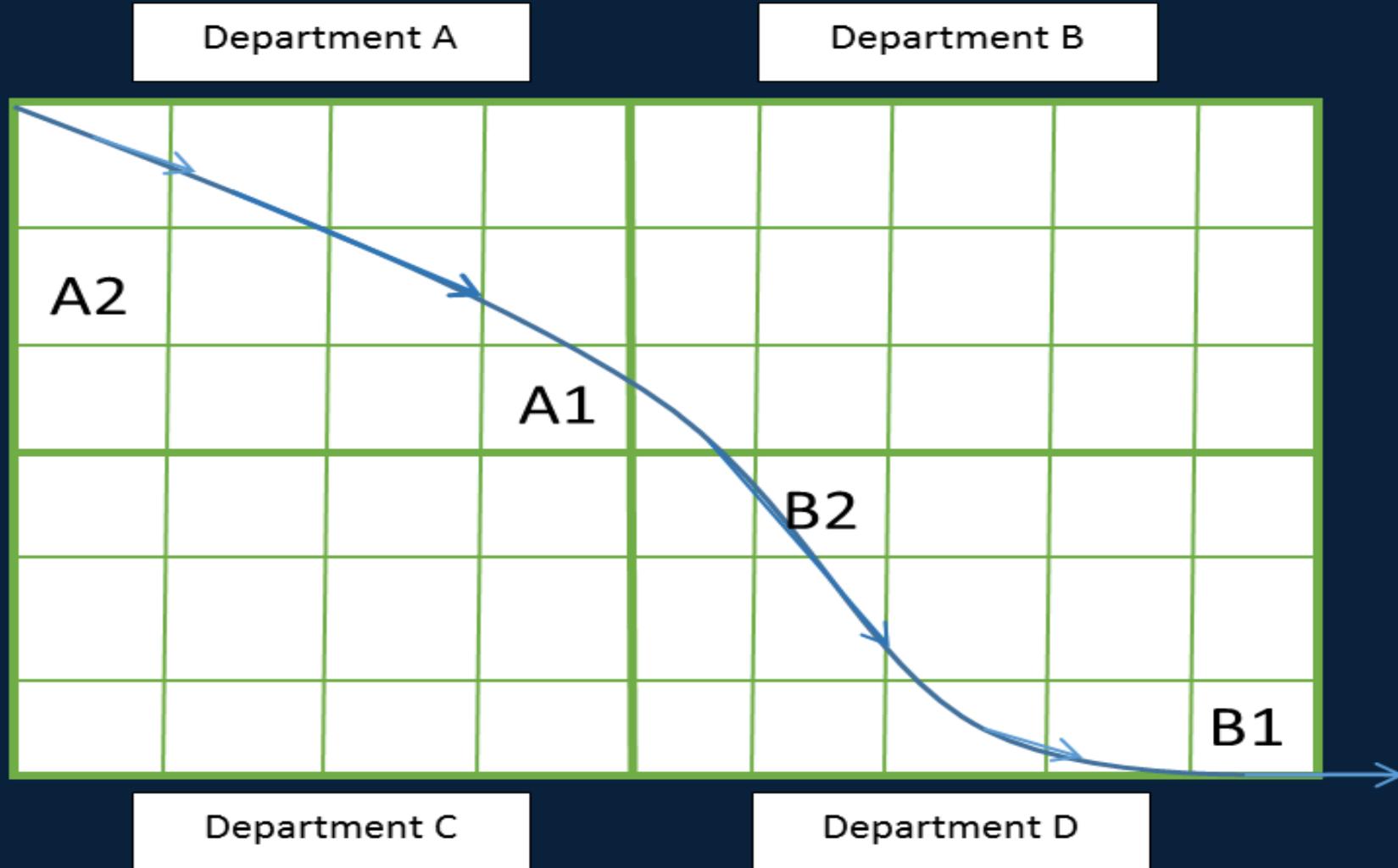
Closeness to border	Studies
Distance to intra-national border	<ul style="list-style-type: none">• Cai et al., 2016;• Grey et al. 2004
On two sides of intra- national borders	<ul style="list-style-type: none">• Sigman, 2005;• Cai et al., 2016;• Limpscomb & Mobarack, 2015
On two sides of international borders	<ul style="list-style-type: none">• Sigman, 2002• Grey et al. 2004

- Developing economy
- Relatively recent process of decentralization

Conceptual Framework

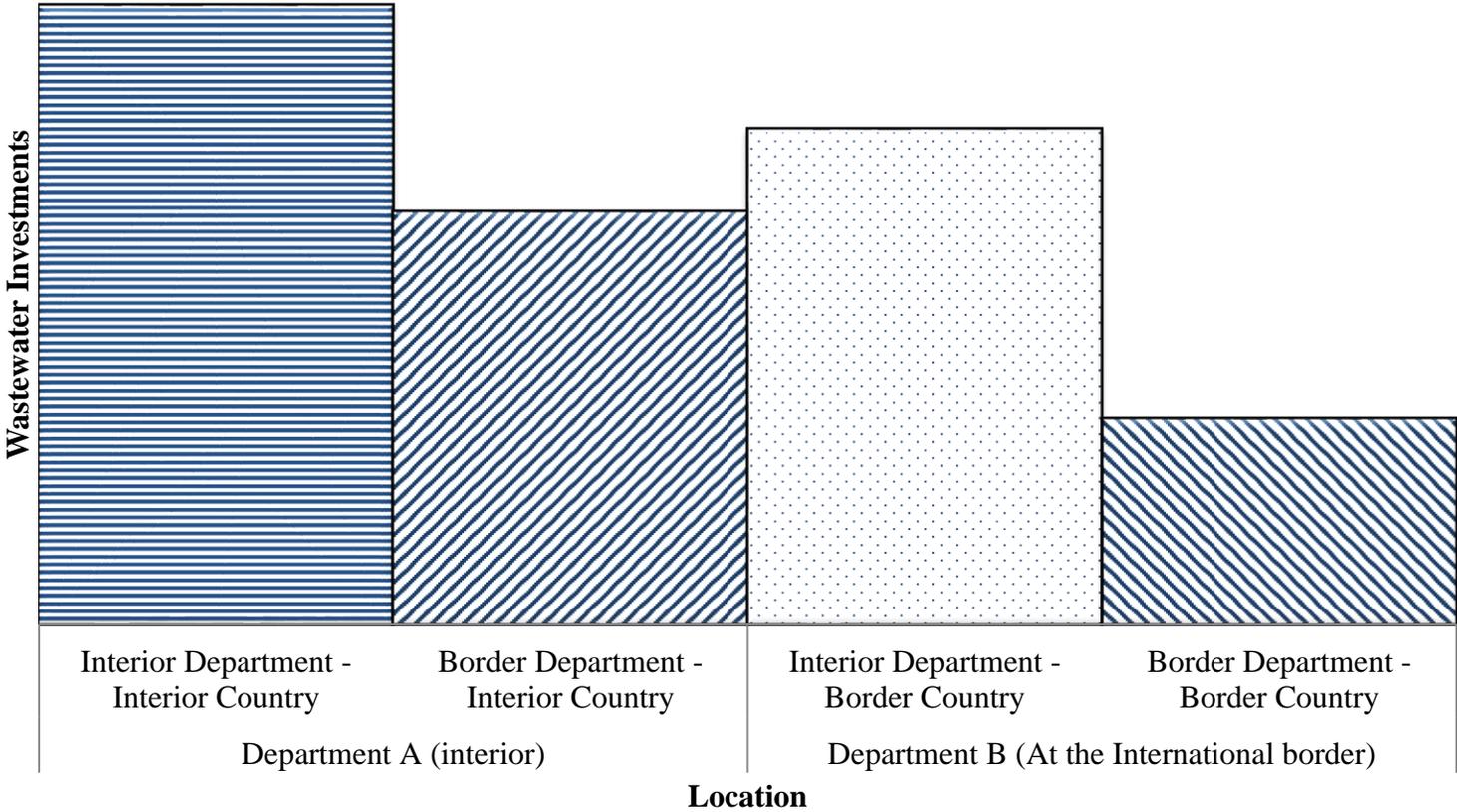
- Central government lever (Grants, enforcement)
- Department lever (Grants, technical support)
- Municipalities decide on investments
- Primary variable:
 - Distance to department border
 - Distance from department border to international border
- Hypothesis:
 - Municipalities closer to a border invest less in wastewater management

Conceptual Framework



Conceptual Framework

Municipal Investments into wastewater management by location relative to borders



Empirical Approach

- Dependent variable:
 - Municipal investments into wastewater management
- Primary Explanatory variables
 - Distance to department borders
 - Distance from department border to international border
- Control variables
 - General Characteristics of municipality
 - Total revenues, tax revenues, intergovernmental transfers

Data

- Municipality Budgetary Panel
- Municipality Panel – General Characteristics
 - Center for Development Studies – CEDE Universidad de los Andes
- Ministry of Finance and Public Credit – Colombia
- Regression Sample period: 2000 – 2013

Empirical Methods

$$y_{it} = \alpha + \beta_D D_i + \beta_I I_i + \gamma X_{it} + r_i + \delta_t + \varepsilon_{it}$$

- Y_{it} : Log Investments into wastewater management by municipality i in year t
- D_i : Distance to department border
- I_i : Distance from department border to international border (international)
- X_{it} : Control variables
- δ_t : Year indicators
- r_i : Region indicators

Results

OLS Estimates of the Effect of Location on Wastewater related municipal investments					
Dependent variable: Log of Municipal wastewater related investments					
	(1)	(2)	(3)	(4)	(5)
Dept. Border indicator	0.18967*** [0.000]	-0.00791 [0.590]	-0.03544*** [0.003]	-0.03052** [0.011]	-0.03279*** [0.008]
General characteristics		X	X	X	X
Budget variables			X	X	X
Other variables					X
Region Dummies		X	X	X	X
Year Dummies		X	X	X	X
Municipal Category Dummies				X	X
Observations	15,014	10,605	10,195	10,195	10,195
R-squared	0.00838	0.51271	0.64486	0.64613	0.64680

Robust p-values in brackets, *** p<0.01, ** p<0.05, *p<0.1

Results

OLS Estimates of the Effect of Location on Wastewater related municipal investments					
Dependent variable: Log of Municipal water related investments					
	(1)	(2)	(3)	(4)	(5)
Distance to Dept. Border (log)	-0.09647*** [0.000]	0.04174*** [0.000]	0.03033*** [0.001]	0.02254*** [0.009]	0.02221** [0.014]
General characteristics		X	X	X	X
Budget variables			X	X	X
Other variables					X
Region Dummies		X	X	X	X
Year Dummies		X	X	X	X
Municipal Category Dummy				X	X
Observations	14,622	10,333	9,940	9,940	9,940
R-squared	0.00491	0.51850	0.67481	0.65278	0.65341

Robust p-values in brackets, *** p<0.01, ** p<0.05, *p<0.1

Results

OLS Estimates of the Effect of Location on Wastewater related municipal investments					
Dependent variable: Log of Municipal wastewater investments					
	(1)	(2)	(3)	(4)	(5)
Distance to Intl. Border (log)	-0.17672*** [0.000]	0.10859*** [0.000]	0.02311 [0.246]	0.02310 [0.253]	0.01481 [0.549]
Distance to Dept. Border (log)	-0.08116*** [0.000]	0.05574*** [0.000]	0.04686*** [0.000]	0.03724*** [0.000]	0.03624*** [0.000]
General characteristics		X	X	X	X
Budget variables			X	X	X
Other variables					X
Region dummies		X	X	X	X
Year dummies		X	X	X	X
Municipal category dummies				X	X
Observations	12,330	8,722	8,404	8,404	8,404
R-squared	0.01685	0.52278	0.66927	0.66911	0.66983

Robust p-values in brackets, *** p<0.01, ** p<0.05, * p<0.1

Result: Alternative specification - Quadratic distance

OLS Estimates of the Effect of Location on Wastewater related municipal investments

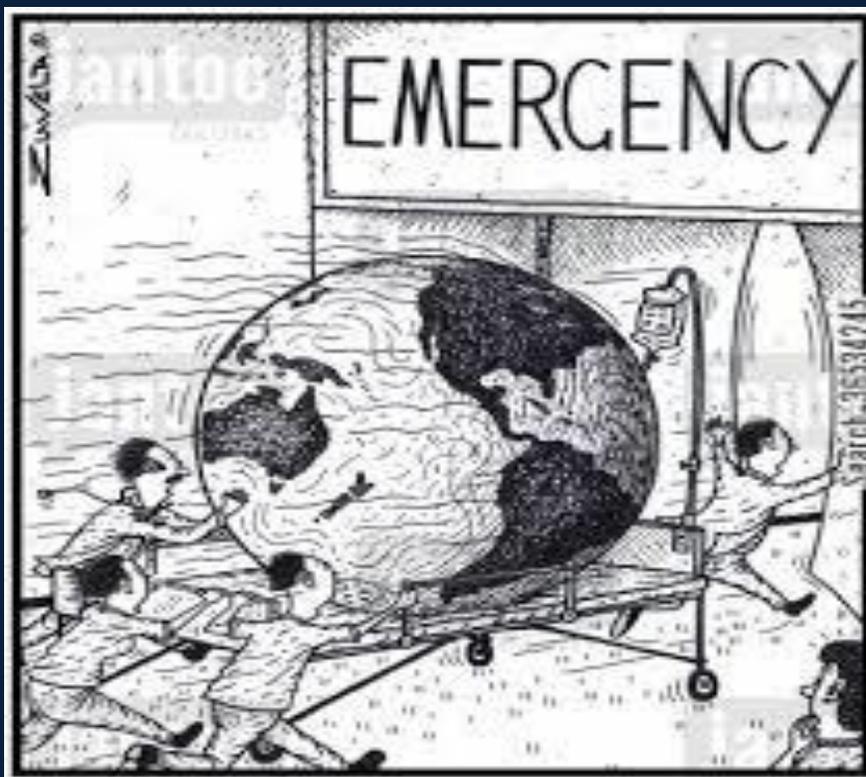
Dependent variable: Log of Municipal water related investments

	(1)	(2)	(3)	(4)	(5)
Distance to Intl. Border	0.30919*	0.58412***	-0.75004***	-0.59207***	-0.78039***
	[0.0672]	[0.001]	[0.000]	[0.000]	[0.000]
Distance to Intl. Border Sqr.	-0.04463***	-0.04646***	0.06697***	0.05249***	0.07281***
	[0.004]	[0.002]	[0.000]	[0.000]	[0.000]
Distance to Dept. Border	0.46307***	0.59476***	0.48125***	0.49871***	0.50731***
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
Distance to Dept. Border Sqr.	-0.06433***	-0.06457***	-0.05054***	-0.05391***	-0.05560***
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
General characteristics		X	X	X	X
Budget variables			X	X	X
Other variables					X
Region dummies		X	X	X	X
Year dummies		X	X	X	X
Municipal category dummies				X	X
Observations	12,330	8,722	8,404	8,404	8,404
R-squared	0.01956	0.52533	0.67197	0.67140	0.67238

Robust p-values in brackets, *** p<0.01, ** p<0.05, * p<0.1

Conclusions

- Distance to departmental borders : positive effect on investments
- Distance to international borders: does not seem to have an effect on investments
- Further explorations:
 - Splines
 - Subsamples



Source: <http://www.jantoo.com/cartoons/keywords/casualty> .
Retrieved: April 7, 2016

Thank you
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