Impacts of Municipal Mergers on Pollution Control: Evidence of River Pollution in Japan

Kazuki Motohashi [1] Michiyoshi Toya [2]

[1] Tufts University [2] Ministry of Economy, Trade and Industry, Japan

Introduction

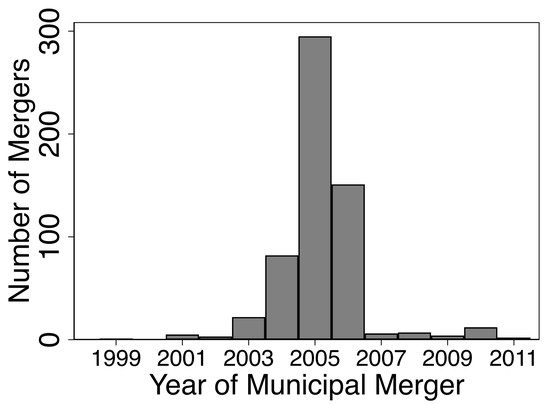
- Municipal mergers have been widely adopted for improving efficiency and quality of public service provision.
- Municipal mergers can have positive impacts on environment through internalizing pollution spillovers.
- However, municipal mergers can hamper pollution control efforts due to coordination costs and skewed distribution of political power among pre-merger municipalities.

Objectives

We examine whether municipal mergers improve or worsen environmental quality (river pollution) and investigate underlying mechanisms.

Municipal Mergers in Japan

- Halve municipalities: 3,232 (1999) → 1,727 (2010)
- Staggered implementation of municipal mergers in all prefectures from 1999 to 2011



Data and Empirical Strategy

Panel data of 3,000 monitoring stations over 30 years

- BOD (Biological Oxygen Demand): water quality indicator
- Municipal merger history (timing, type, involved municipalities)

Difference-in-differences (DID) model

- Two-Way Fixed Effects DID

$$\ln(BOD_{i,t}) = \alpha + \beta_1 Merger_{i,t} + \lambda X_{i,t} + \delta_i + \theta_{b,t} + \varepsilon_{i,t}$$

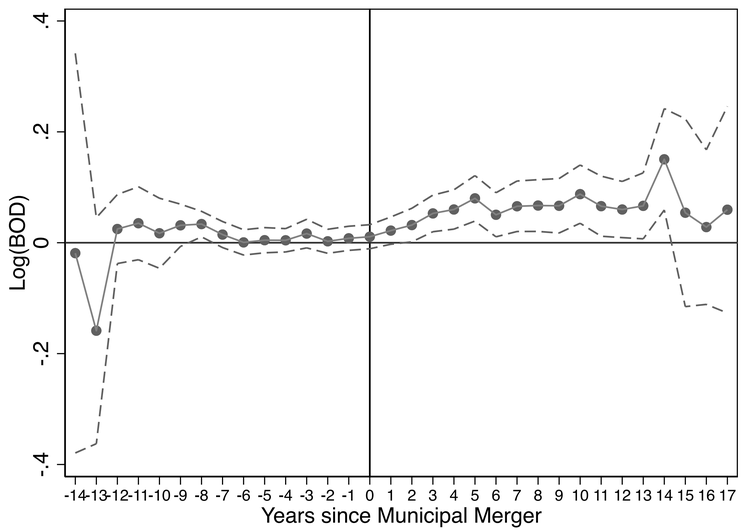
where i is monitoring station, t is year, b is basin.

- Callaway and Sant'Anna (2021) Estimator

→ Robust to potential bias from negative weights in staggered DID design

Results

Municipal mergers increase river pollution by 6%.



Mechanisms

Coordination Cost

- The effect is salient in "equal-footing" mergers (among municipalities of similar size) with higher coordination cost.

Political Economy

- The effect is salient in "incorporated" municipalities (those incorporated by larger ones) with smaller political power.

	Coordination Cost		Political Economy	
	(1)	(2)	(3)	(4)
	Equal-footing	Incorporating	Incorporated	Incorporating
Merger (= 1)	0.063***	0.046*	0.091***	0.033
	(0.019)	(0.027)	(0.034)	(0.028)
Observations	54,579	48,139	32,568	44,988
R^2	0.885	0.886	0.891	0.887
# of Stations	2,373	2,093	1,416	1,956
# of Municipalities	813	598	541	593
Mean of Dep. Var.	2.671	3.033	3.130	3.144

Null results on other potential mechanisms

- Internalization of negative externality
- Change in land use

Conclusion

- We find negative effects of municipal mergers on environmental outcomes in terms of river pollution.
- This finding runs counter to the negative externality narrative of pollution emphasized in past studies.
- The negative effects and relevant channels (coordination cost and political economy) should be carefully considered in the cost-benefit analysis of future municipal mergers.

*The views expressed in this paper are those of the authors and should not be attributed to the Ministry of Economy, Trade and Industry, Japan.