Tax Me, But Spend Wisely

Public Finance and Government Accountability

Lucie Gadenne

University College London & Institute for Fiscal Studies

LSE, 16/10/2012

Public resources and development

- Developing countries need to increase their public revenues to meet health, education challenges (Duflo, 2011).
  BUT
- Plenty evidence that their governments waste/divert revenues (Reinikka and Svensson, 2005; Olken, 2007; Caselli and Michaels, 2011; Brollo et al, 2011... Litschig, 2012)

Public resources and development

- Developing countries need to increase their public revenues to meet health, education challenges (Duflo, 2011).
  BUT
- Plenty evidence that their governments waste/divert revenues (Reinikka and Svensson, 2005; Olken, 2007; Caselli and Michaels, 2011; Brollo et al, 2011... Litschig, 2012)
- This literature generally considers local governments...
- And increases in non-tax revenues: inter-governmental transfers, oil royalties, aid.
- Would increases in tax revenues be spent similarly?

Sources of public resources and accountability

Idea of connection between how governments are financed and how they spend their revenues dates back to Schumpeter (1918).

- Governments may have to spend tax revenues better than non-tax revenues because:
  - Governments that need to tax more have to allow citizens more control of the public purse (London, 1688).
  - Citizens that are taxed demand more from their governments (Boston, 1773).

Research Question

Do local governments spend extra tax revenue 'better' than extra transfer revenue?

- I consider two policies that increase tax or transfer revenues of Brazilian local governments.
  Intermediate result: impact of a tax modernization policy in a low tax compliance setting.
- I compare the marginal propensity to spend on local public services and corruption from an increase in taxes and from an increase in transfers.

Method

- I use a tax modernization program to identify the impact of an increase in taxes.
- DiD + particularities of the program's timing are used to disentangle potential selection and treatment effects and flexibly test for pre-treatment trends.
- I identify the impact of an increase in transfers using discontinuities in the transfer allocation rule, following Brollo et al. (2011), Litschig (2012), Litschig & Morrison (2012).

Preview of the results

- An increase in local tax revenues leads to a bigger increase in municipal health and education provision than an increase in federal transfers of the same amount.
- Higher transfers lead to more corruption, higher taxes do not.
- Some evidence that these different propensities to spend are due to information asymmetries.

Outline

- Context and data on Brazilian local governments.
- First stages: the tax and transfer policies.
- Comparing taxes and transfers: identification and results.

Brazilian local governments have substantial expenditure and fiscal autonomy

- Third tier of government in Brazil, more than 5,000 municipalities of average population 25,000.
- Spend 17% of public revenue, education is the largest budget item, health the second largest. Corruption is widespread (Ferraz and Finan, 2009).
- Roughly 12% of revenues come from local taxes, 30% from one main federal transfer, *FPM*. **Spending of tax and FPM revenues is unconstrained.**
- Municipalities have *de jure* tax autonomy: two main local taxes (property, services) whose rates they can freely set.

Data

Panel data, 1999-2009

- Outcomes: taxes (*FINBRA*), municipal education infrastructure quality and quantity (*Censos Escolar*), health infrastructure (1999, 2002, 2005, 2009).
- Covariates: program participation, GDP, share of agriculture and services in GDP, population, political variables.

Repeated cross sections

- Outcome: reports from randomized audits for the years 2003-2006. Number of irregularities per million Rs audited.
- Covariates: program participation, Census variables for the year 2000, municipal characteristics.

The tax policy: PMAT program

- The program provides local governments with a loan to invest in modernizing their tax administration since 1998.
- 331 municipalities started a PMAT program between 1998 and 2008 (40% of population).
- The program was used to:
  - Increase knowledge of the tax base (tax registers)
  - Facilitate tax payments (multiplying frequency and means of payments)
  - Increase control of taxpayers (cross-checking of information, audits).
- The loan had to be spent on tax administration, not education and health.

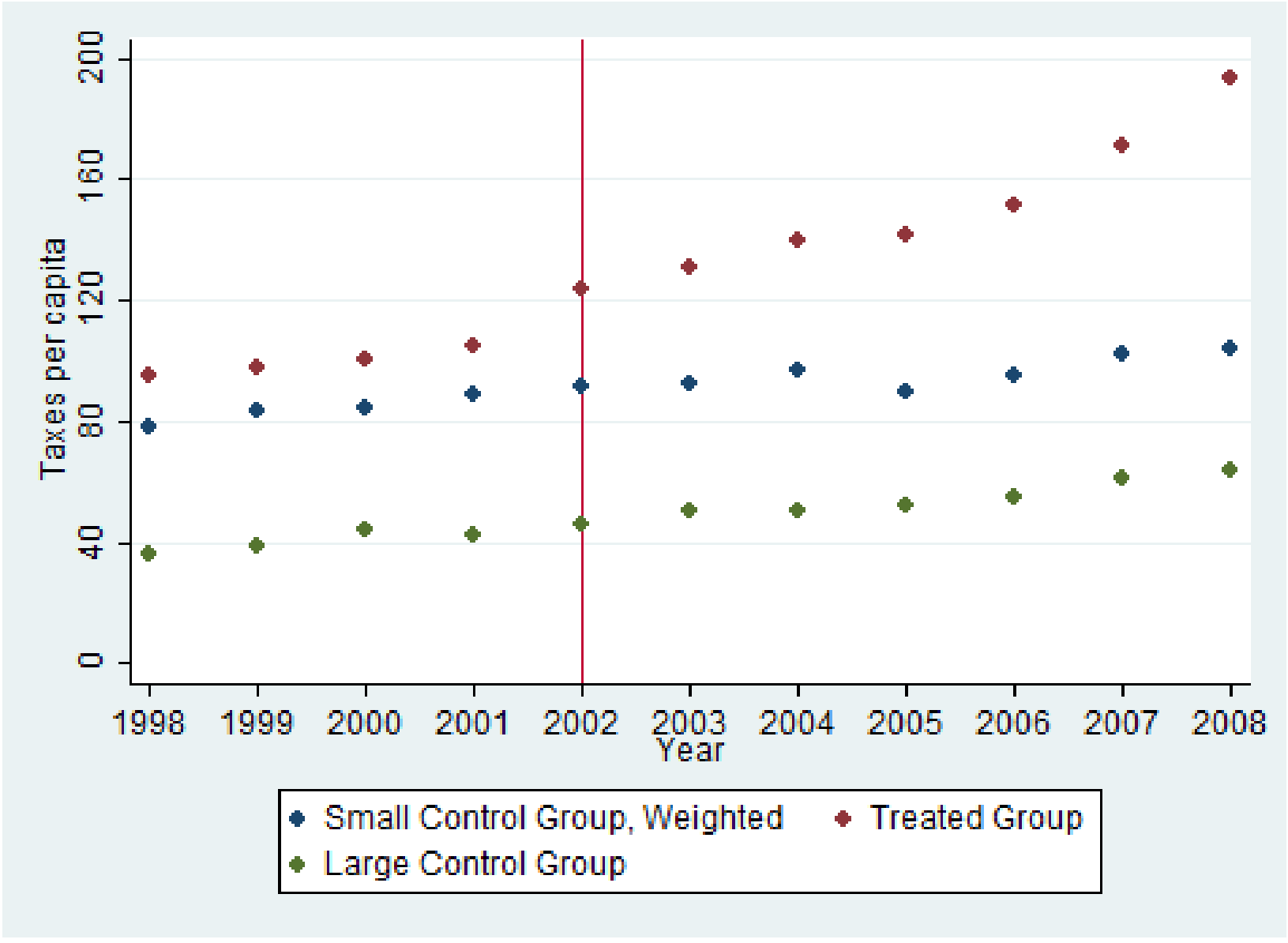
More on PMAT

Program participation as an instrument for tax revenues

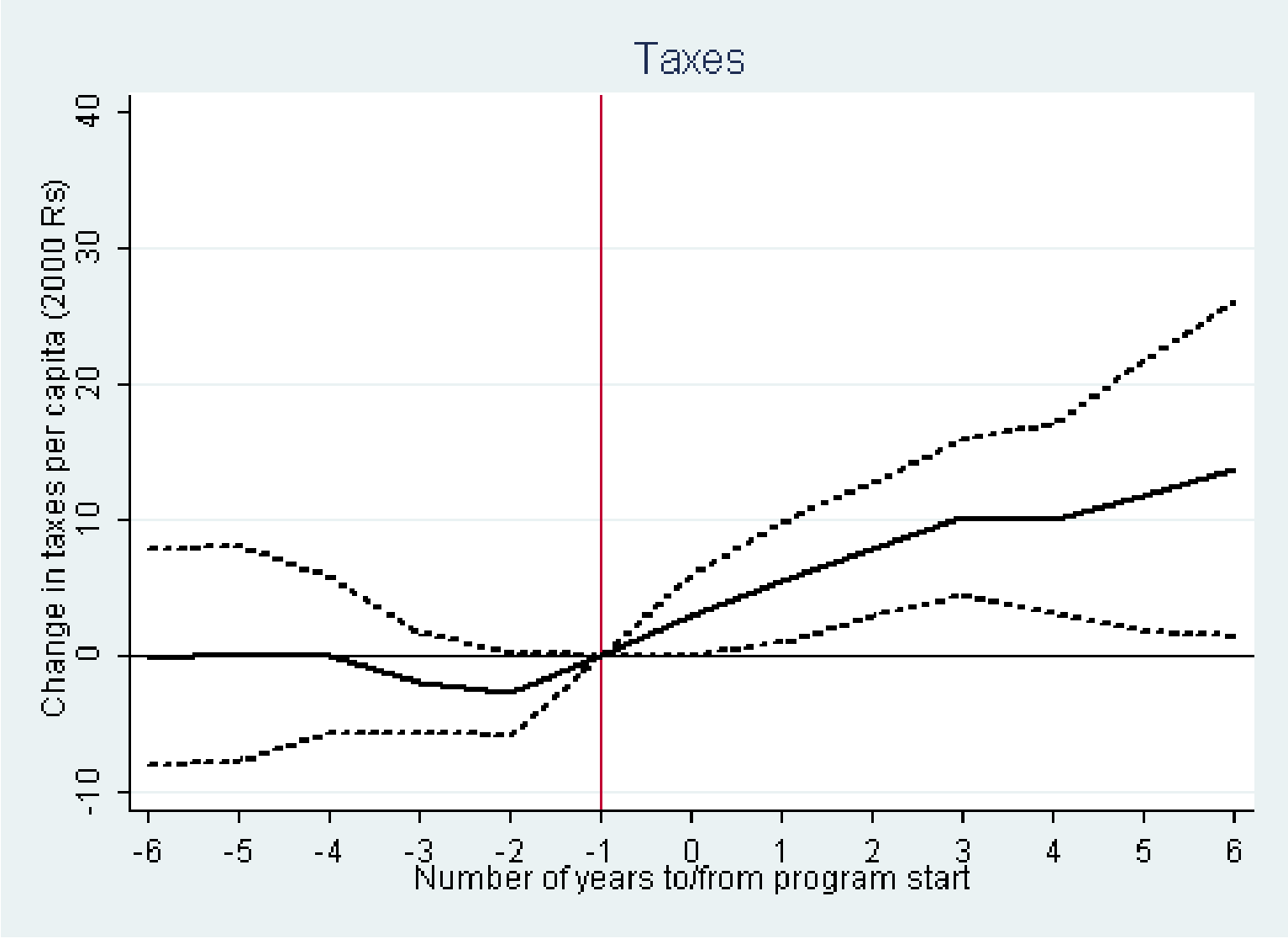
- Selection in the program is voluntary, municipalities that join are bigger, richer, more urban.
- I use variations over time to control out baseline (time-invariant) differences between treated and control groups and check for pre-treatment trends.
- Matching/propensity score weighting creates a control group that's a more credible counterfactual (Hirano et al. 2002, 2003).
- Key identification challenge: disentangling treatment and selection effects.

Reduced form specification

Evolution of tax collection in treated and control municipalities



The program increases taxes by 11%



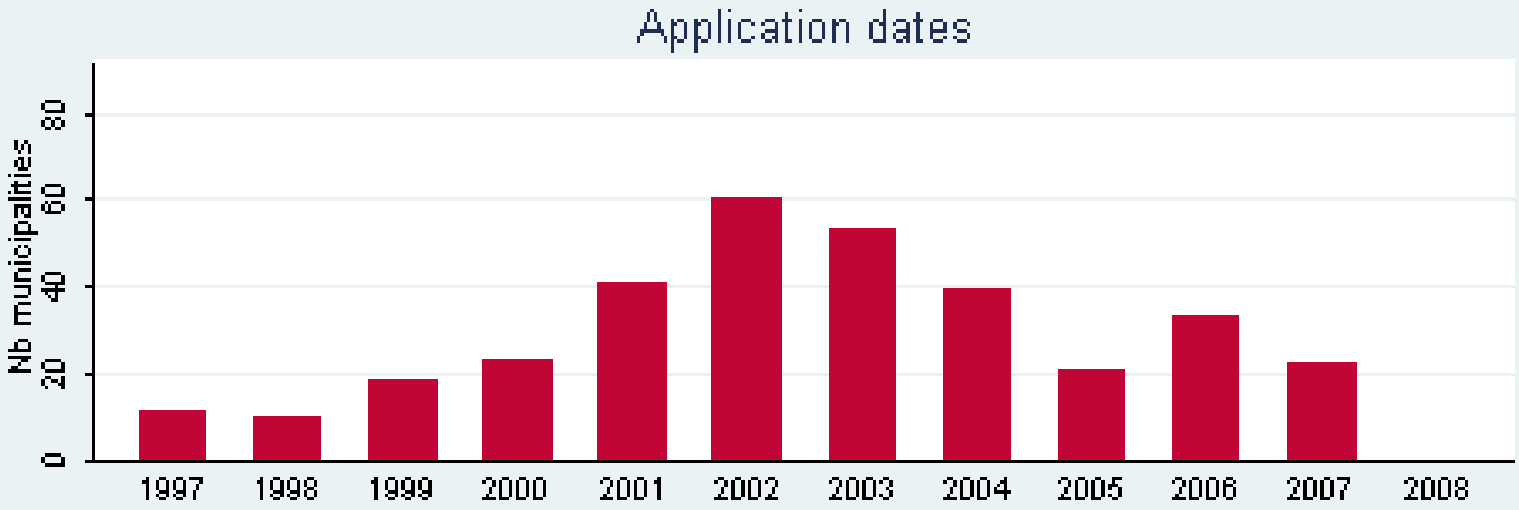
Baseline tax collection: 100 Rs before the program starts

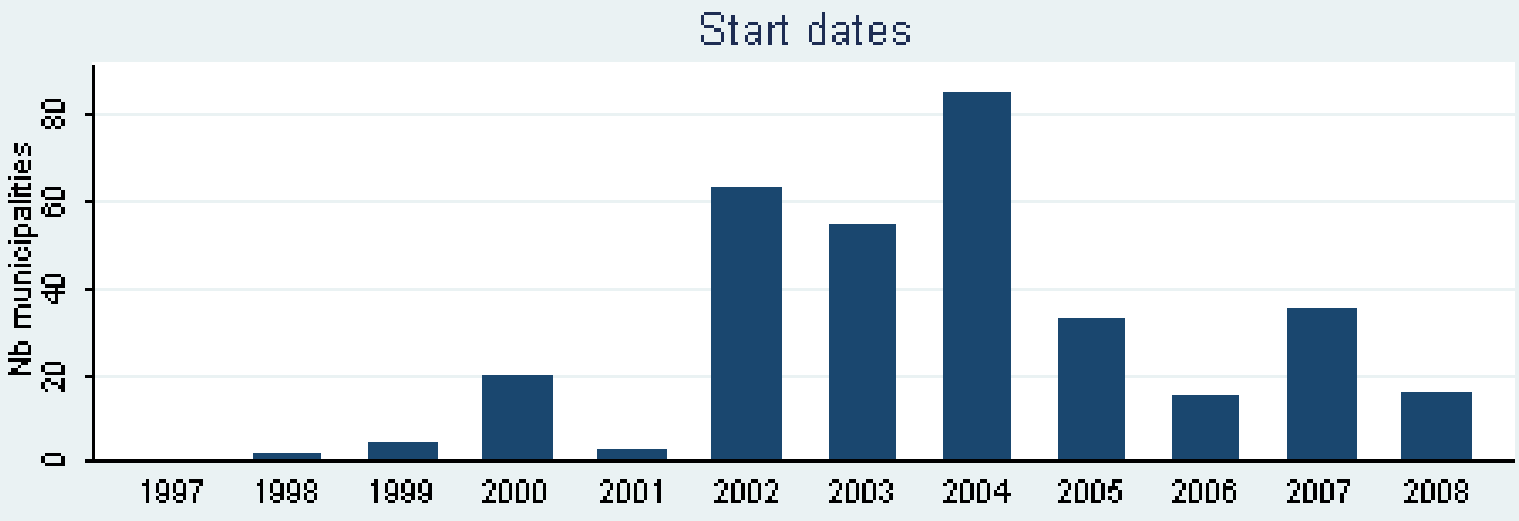
Disentangling treatment and selection effects

Selection and treatment happen sequentially.

- Municipalities choose when they **apply** to the program and then wait up to 4 years before they start the program.
- The year in which they **start** the program is largely determined by supply side constraints: the resources devoted to processing files varied over time.

The 'supply' of the program varied over the years





Simply applying to the program does not have an impact on outcomes

- Impact of the program by time between application and program start

Time between application and program start	0 year	1 year	2-3 years
3 years before	4.298	-0.540	-1.149
	(3.314)	(2.782)	(2.367)
2 years before	-1.994	-2.675	-0.955
	(3.572)	(3.210)	(3.269)
1 year before	0.361	0.994	1.557
	(4.049)	(3.918)	(3.415)
Program : all years	8.019*	10.248**	10.251***
	(4.581)	(4.634)	(3.816)
Observations	25436	26584	25593
Clusters	2374	2480	2389

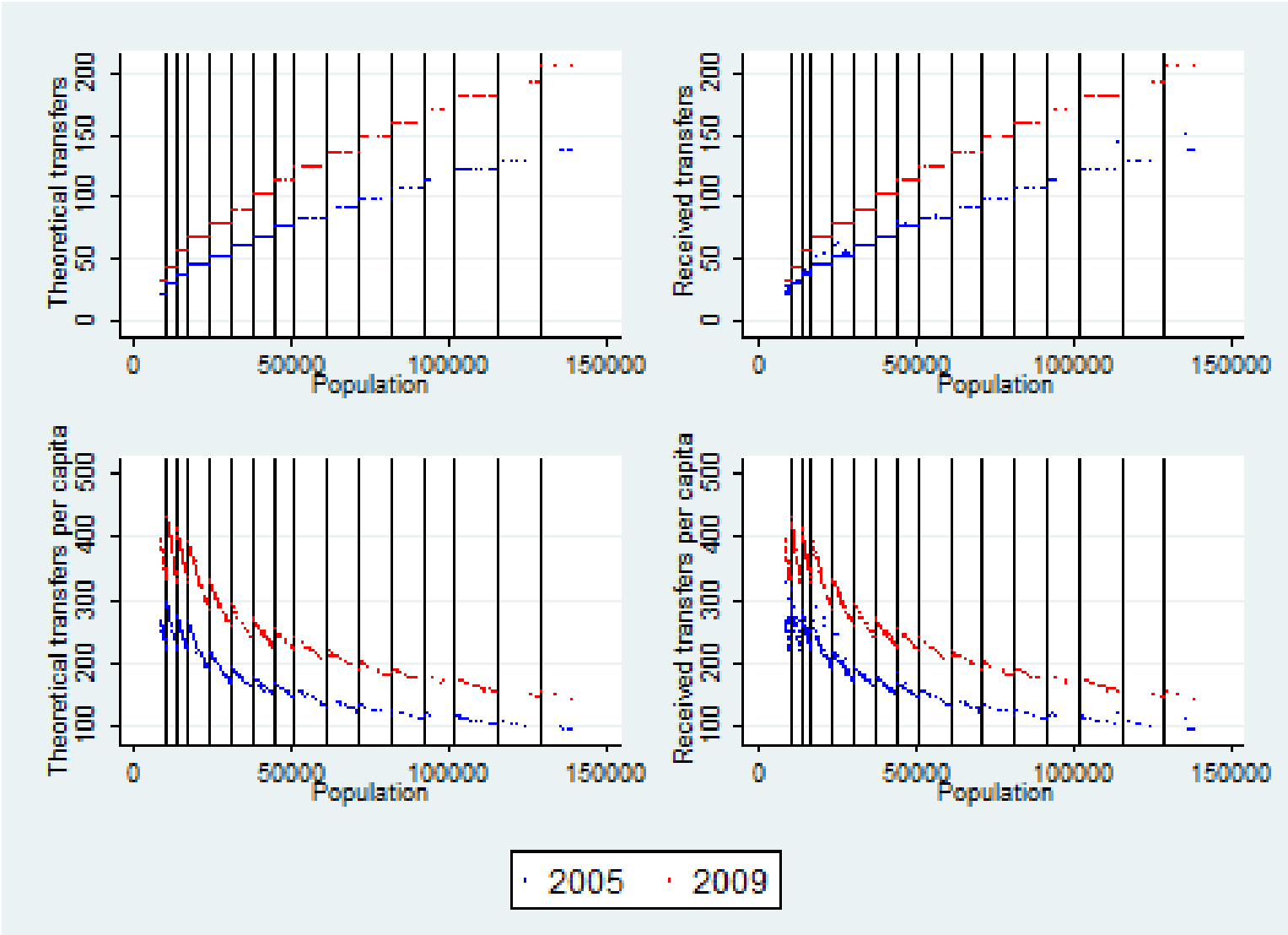
Identification: Transfers

- I consider the main federal transfer (*FPM*) which represents 30% of local budgets on average and is unrestricted.
- A discontinuity in the rule allocating this transfer provides identifying variations. This approach follows Litschig (2012, 2012) and Brollo et al (2010).
- A RDD in spirit, though I use within municipality variations - impact of thresholds is very similar within and between.

FPM

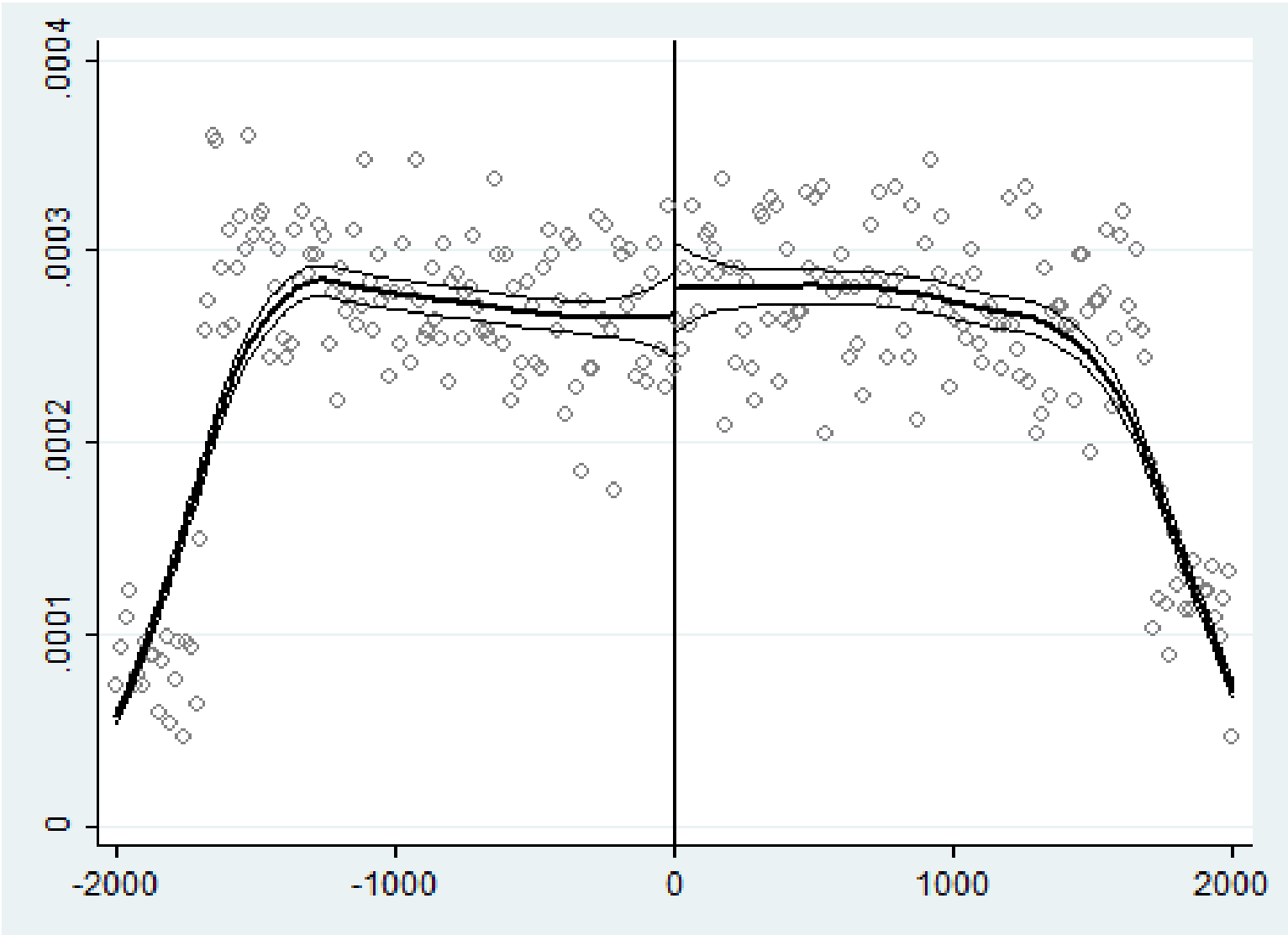
The discontinuity in the FPM allocation rule

Real and Theoretical FPM Transfers for the state of Sao Paulo



Do municipalities manipulate their population?

McCrary test, pooled thresholds.



Identification: Taxes vs Transfers

- I compare the impact of taxes and transfers on spending outcomes using

$$Y_{i,t} = \pi_0 + \pi_T T_{i,t} + \pi_F F_{i,t} + \eta_1 X_{i,t} + \mu_i + \gamma_t + \xi_{i,t} \quad (1)$$

- Taxes T are instrumented for using program status, transfers F using theoretical transfers.
- We expect $\pi_T > \pi_F$ when Y is local public goods, and $\pi_T < 0 < \pi_F$ when Y is corruption.

Identification: Taxes vs Transfers (2)

- Assumption for transfers: no other policy discontinuous + no sorting.
- Assumption for taxes: program does not directly affect outcomes (by definition) + same pre-treatment trends. Use application/start dates to check.

Identification: Taxes vs Transfers (3)

Assumption: marginal propensity to spend from taxes and transfers is the same in the municipalities affected by the two instruments.

- I'm comparing two different LATEs...
- But I have 15 LATEs I can use to estimate the impact of transfer.
- Tells us something about underlying heterogeneity of parameter.
- Thresholds 8,9,10 look very similar to PMAT and are given more weight.

Impact of taxes and transfers on local spending outcomes

- Impact of a 1 Rs increase in taxes or transfers per capita

	Educ-quantity	Educ-quality	Health	Corruption
Taxes	0.185**	0.217***	1.208*	-10.255
	(0.059)	(0.113)	(0.613)	(9.531)
Transfers	0.004	0.006	-0.102	12.812***
	(0.029)	(0.027)	(0.132)	(4.219)
Observations	20526	20526	7226	424

Robustness checks

- No evidence of pre-PMAT trends in outcome variables either.
- Reduced form impact of PMAT on group of treated only yields similar results.
- Estimated impact of transfers varies by threshold, some impact on education and health at the lower thresholds... but always much smaller.

Robustness checks

Where revenues come from matters for the quality of governance

- IV evidence suggests extra tax and transfer resources are spent differently.
- Why?
- Some evidence that this is due to information asymmetries, and not an increase in predictability of revenues or politicians' incentives to increase the tax base.

Radio

Conclusion

- Voluntary tax capacity programs lead to more public revenues that seem to be spent better than extra transfer revenues.
- This suggests that tax decentralization is a necessary component of successful decentralization.
- And provides further support for the idea that state capacity building is central to the concept of development.

Robustness checks

- Estimation on the treated only (early vs late starters) yields similar results.

Estimation on treated only

- Results are very similar when using all control municipalities or a log specification.

Specification checks

- Allowing for spatial and over-time correlation leaves standard errors unchanged.

Taxes vs Transfers: the hypothesis of interest

If taxes are spent better than transfers we expect that:

- The increase in taxes thanks to the program will lead to a higher increase in public good provision (education) than an increase in transfers of the same amount.
- The increase in taxes thanks to the program will lower the share revenues diverted (corruption), an increase in transfers of the same amount will increase it.

Municipalities that join the program update their tax registers more than others

- Share of municipalities who updated their property tax register between 1998 and 2003

	% updated 1998-2003	Number municipalities
Control	72%	4723
Started after 2003	70%	122
Started before 2003	83%	146

Source : Perfil dos Municipios Brasileiros, 2004.

A large share of municipal transfers are allocated according to a set rule

- The largest source of local revenues is a constitutionally mandated federal transfer : *Fundo de Participacao dos Municipios* (FPM).
- Transfer amounts are fixed according to local population in a discontinuous fashion:

$$FPM^s_{i,t} = \frac{f(pop_{i,t})}{\sum f(pop_{j,t})} FPM^s \tag{2}$$

Where FPM^s is the total amount of FPM funds allocated to the state s and $f(pop_{i,t})$ is a coefficient depending on population size.

The FPM coefficients

Population	$f(pop_{i,t})$
<10,189	0.6
10,189-13,584	0.8
13,585-16,980	1
16,981-23,772	1.2
23,773-30,564	1.4
...	...
142,633- 156,216	3.8
≥156,217	4

I calculate 'theoretical FPM' based on the rule, then use this as an instrument for actual FPM transfers in the equation :

$$Y_{i,t} = \pi_0 + \pi_T T_{i,t} + \pi_F F_{i,t} + \eta_1 X_{i,t} + \mu_i + \gamma_t + \xi_{i,t} \quad (3)$$

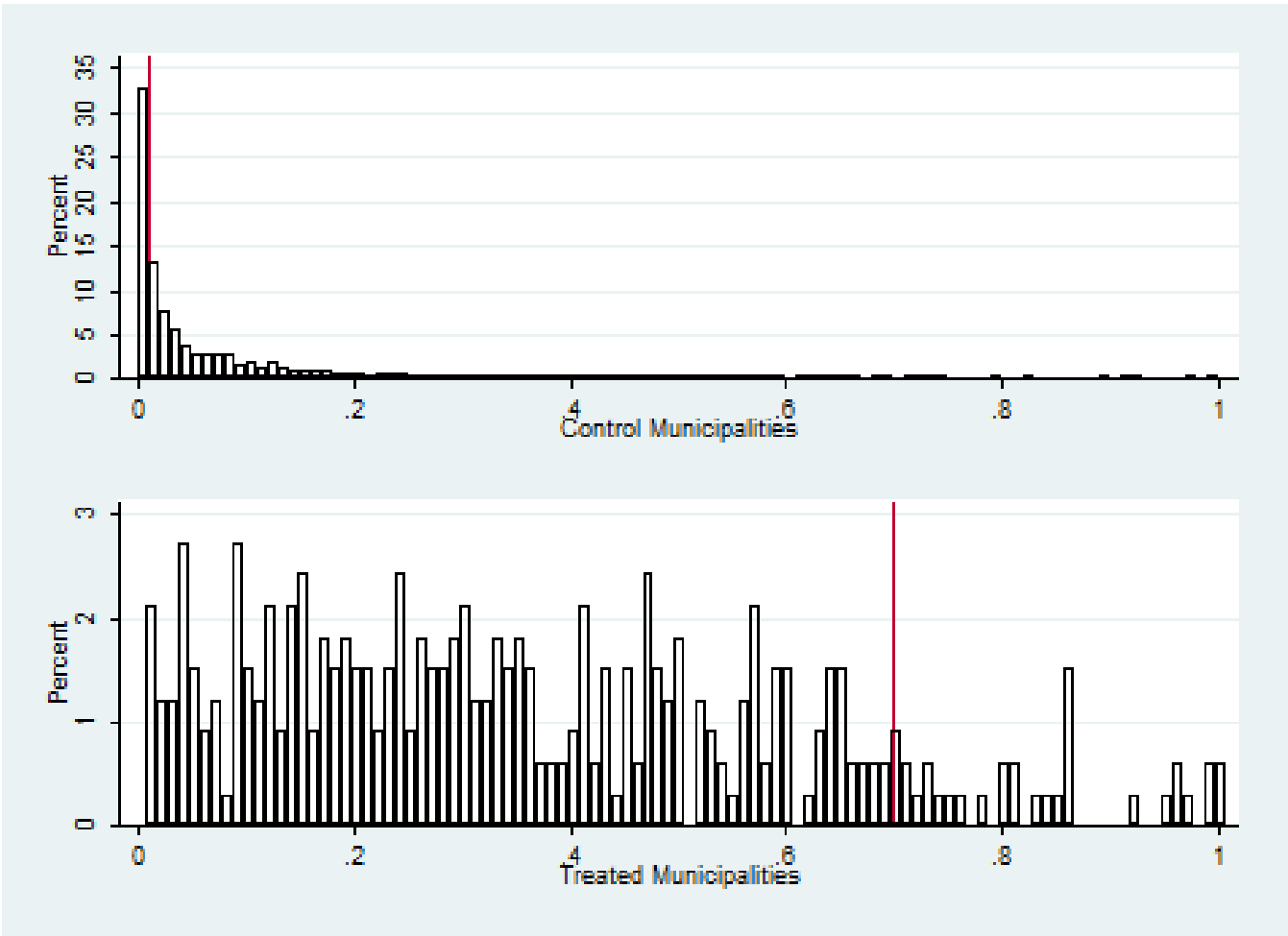
where X includes a polynomial in population.

Estimating the propensity score

- I estimate a probit model of the probability that a municipality started a PMAT program between 1998 and 2008 as a function of pre-intervention characteristics.
- Estimated probabilities are then used to construct the common support : I exclude control (treated) obs. with a $\hat{p}$ lower than the midpoint of the 1st (99th) pctle of the distribution of $\hat{p}$ for the treated (control) group.
- Weights used are 1 for the treated group and $\frac{\hat{p}}{1-\hat{p}}$ for the controls.

The common support sample

Distribution of the estimated probability of joining the program (red lines indicate the limits of the common support)



Impact of the program, alternative specifications

	Treated only, until 2003	Treated only, no year FE	All, no year FE
Dep. var: taxes			
Program : all years	7.746*	16.802***	16.846***
	(4.630)	(1.747)	(2.509)
Observations	959	3188	24049
Municipalities	330	325	2462
Dep. var: school infrastructure			
Program : all years	0.161***	0.208***	0.204***
	(0.051)	(0.037)	(0.051)
Dep. var: school quality			
Program : all years	0.113*	0.385***	0.367***
	(0.064)	(0.052)	(0.061)
Observations	1623	3255	24049
Municipalities	331	331	2462

Whole sample and log specification

1st column : whole sample, 2nd column : logs

	Taxes		Sch. Infrastructure		School Quality	Corruption	
	(1)	(2)	(1)	(2)	(1)	(1)	(2)
Program	9.812***	0.072**	0.142***	0.055***	0.278***	-56.282	-0.467**
	(2.050)	(0.028)	(0.037)	(0.017)	(0.046)	(42.152)	(0.216)
Obs	35562	24049	35562	24049	35562	705	483
Mncp	3654	2462	3654	2462	3654	705	483

Determinants of program uptake

Hazard model of the probability of entering the program

	1		2
Income	0.141***	Distance to closest PMAT	-0.003**
	(0.046)		(0.002)
Education	0.706	Time	0.003**
	(0.542)		(0.001)
Urban pop.	0.006***	Growth in GDP 96-99	-0.918
	(0.002)		(0.603)
Inequality	0.003	Growth in population 96-99	-0.385
	(0.005)		(2.309)
Population	0.223	Growth in taxes 96-99	-0.406
	(0.215)		(0.276)
Taxes p.c	-0.000	Observations	25420
	(0.000)	Municipalities	3089
Agr\ GDP	-0.111***		
	(0.025)		

Asymmetries of information

Impact of a 1 Rs increase in taxes or transfers per capita

	Educ quantity		Educ quality		Health		Corruption	
Transfers per capita	-0.007		0.010		-0.179		10.851***	
	(0.030)		(0.013)		(0.191)		(3.657)	
Transfers*Radio	0.009		0.028*		0.112*		-1.015	
	(0.006)		(0.015)		(0.059)		(2.015)	
Taxes per capita		0.217		0.192**		1.101***		1.761
		(0.135)		(0.871)		(0.314)		(11.210)
Taxes*Radio		-0.011		-0.003		0.046		-11.108
		(0.092)		(0.021)		(0.103)		(20.162)
Radio							-8.581	-7.627
							(21.754)	(12.684)
Observations	20544	28214	20526	28182	7226	9999	424	526

A difference-in-differences specification

Reduced form

- When panel data is available I estimate the following regression:

$$Y_{i,t} = \sum_{i=-9}^{-2} \delta_j Pre_{jit} + \sum_{i=0}^{9} \beta_j Post_{jit} + \delta X_{i,t} + \gamma_t + \mu_i + \epsilon_{i,t} \quad (4)$$

  where $Y_{i,t}$ is 1) taxes 2) measures of the quantity/quality of local health/education provision.

- When panel data is not available I estimate the following regression:

$$C_{i,t} = \alpha + \beta P_{it} + \beta_2 S_i + \delta X_{i,t} + \delta_2 W_i + \gamma_t + \nu_{i,t} \quad (5)$$

  where $C_{i,t}$ is the corruption index.