

# **Decentralization and Governmental Transfers in Developing Countries: The Case of Paraguay**

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Camilo Abbate, University of California, Santa Barbara

October 7, 2025

# Key instrument in Decentralization: Intergovernmental Transfers



Central Gov



State

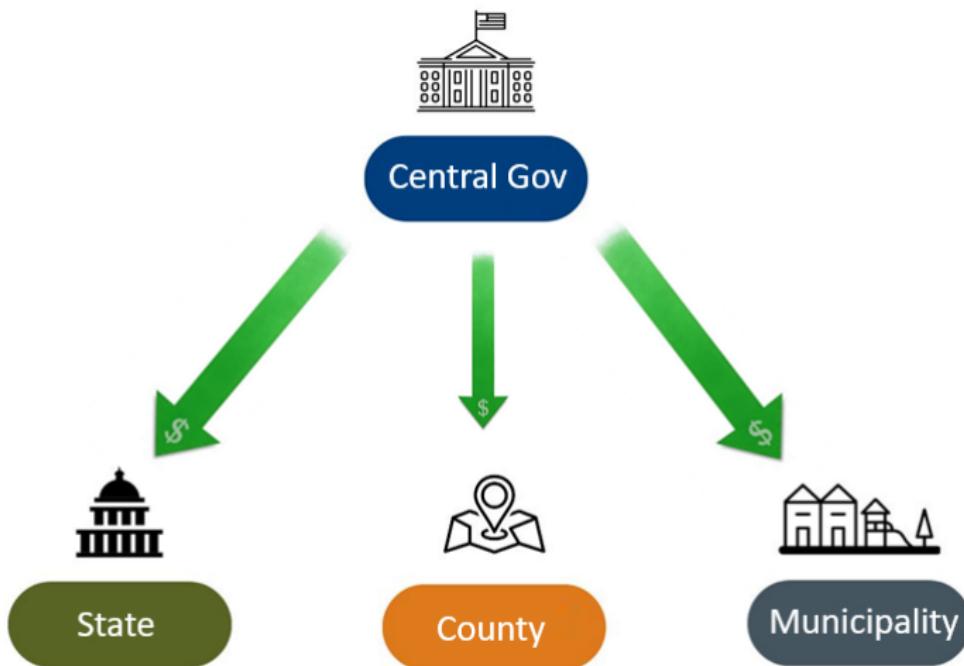


County



Municipality

# Key instrument in Decentralization: Intergovernmental Transfers



## Key instrument: Intergovernmental Transfers

- Boost sub-national government spending in priority areas
- Reduce imbalances when taxing capacity can't meet expenditure needs across regions
- Address externalities between jurisdictions

# Intergovernmental Transfers



## Key instrument: Intergovernmental Transfers

- Perverse incentives to relax tax mandates (Crowding out)
- Rent seeking behaviour of local politicians
- Corruption, weakening of democracy (Resource Curse)

## Research Question(s)

- What is the effect of intergovernmental transfers on municipal finances (revenues and expenditures)?
- Do they crowd out (in) local tax collection?

## Additional Research Question(s)

- Do intergovernmental transfers translate into local development?
- How does it affect political incentives and citizen engagement?

# Data Sources

- **Public Economics Outcomes**

- Annual revenues and expenditures of municipalities
- Revenue: taxes, fees, public asset rents
- Expenditure: personnel, infrastructure, social assistance

- **Development Outcomes**

- School enrollment
- Satellite-based night-time luminosity (NASA's Black dataset)

- **Political Outcomes**

- Digitized 500+ financial disclosures of mayors (self reports)
- Mayoral elections and candidates (1996–2022)
- Voting behavior by age cohort (turnout rates)

## Empirical Setting

- Central government transfers to municipalities are **population-based**
- Formula based on the share of population relative to a group of similar municipalities (two tiers).
- Population counts (and projections) come from the **Census**, conducted every 10 years (2002, 2012, 2022).

## Exogenous Shock to Transfers

Unexpected population adjustments from a botched census (2012).

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The Americas | Paraguay's population puzzle

## Over a million Paraguayans disappear in the latest census

The country's population is a fifth smaller than thought. Why?



More to the point, the 2012 census was botched. The then president had just been impeached. Those in charge of the survey were replaced. Contractors went on strike over late pay. In the end, they reached barely three-quarters of the population. "They did what they could with what they had," concedes Ms Medina. Officials had to fall back on the 2002 census, which recorded a population of 5.2m, both to hazard a guess at the 2012 population and project its growth. Yet birth rates fell and migration had picked up sharply in the early 2000s, so this extrapolation diverged further from reality each year.



IMAGE: GETTY IMAGES

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## Effect of intergovernmental transfers on:

- **Local Public Finances**
  - Inverse relationship between transfers and tax collection
  - Inverse relationship between transfers and expenditures
- **Development:**
  - No effect on public school enrollment
  - Positive effect on night-time luminosity for Higher Transfers

### **Political economy outcomes: Noisy estimates**

- Voter turnout: Inversely related to intergovernmental transfers
- Mayors' wealth: No effect
- Noisy incumbent advantage

## **Institutional Details**

## Paraguay: Two hydroelectric power plants



Itaipu: 3rd largest  
dam in the world



(shared with Brazil)

Yacyreta:  
shared  
with  
Argentina



## Paraguay: Two hydroelectric power plants

Excess energy is sold to Argentina and Brazil



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Central Government manage these funds  
(“royalties”: 2.5% of the GDP)



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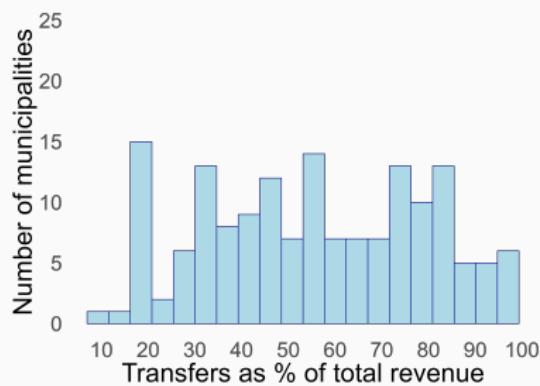
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Distributes to municipalities

# How important are these funds?

Transfers as fraction of total revenues, all municipalities



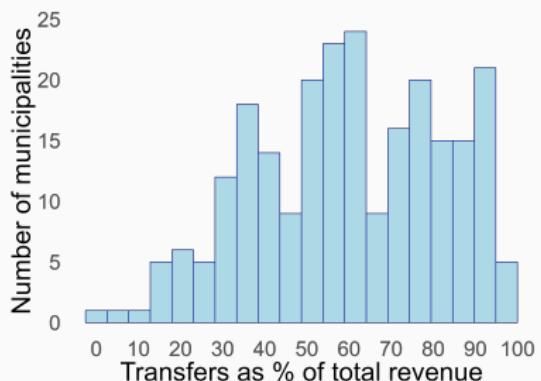
(a) 2010:  $\mu = 55\%$  Median = 54%

# How important are these funds?

Transfers as fraction of total revenues, all municipalities



(a) 2010:  $\mu = 55\%$  Median = 54%



(b) 2015:  $\mu = 59\%$  Median = 60%

## Distribution of transfers – Population Weights

$$f \left( \frac{\text{Population municipality i}}{\text{Population group}} \right)$$

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- Censuses: every 10 years, conducted by National Institute of Statistics (INE)
- 2002 Census projections used for **transfers** in the next decade
- **Expected:** In 2014, the 2012 Census **should** have adjusted the population counts

# Failure of 2012 Census

OPINIÓN

## El Paraguay sin cifras, un país indescifrable

Creo que hay temas en nuestro país a los que no se les presta la atención que merecen ni se les valora en su verdadera importancia. Un día aparecen en la prensa y rápidamente son opacados por noticias más llamativas y ruidosas y quedan en el olvido.

POR ROLANDO NIELLA  
15 DE JUNIO DE 2013. - 21:06



El fracaso de este último censo, realizado en el 2012, es sin duda uno de esos casos. Tener cifras actualizadas y fiables sobre el país es crucial para diseñar y aplicar políticas económicas y sociales. Administrar el país sin datos reales ni

al **fracaso del censo del 2012**, sostienen desde el INE

31 agosto, 2023 0 255

**“fracaso” al censo, que 80% de la población**

ca de USD 20 millones, pero la baja  
- - - - - del 20%  
**poblacional falló debido** nales



# Failure of 2012 Census

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## Over a million Paraguayans disappear in the latest census

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IMAGE: GETTY IMAGES

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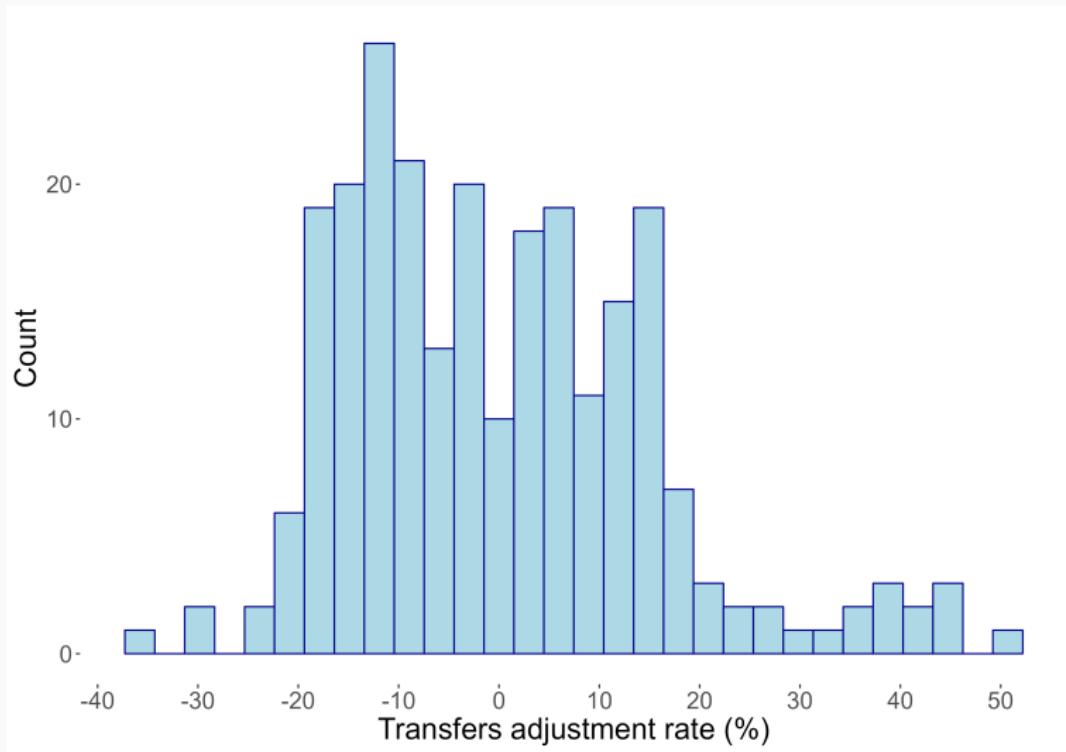


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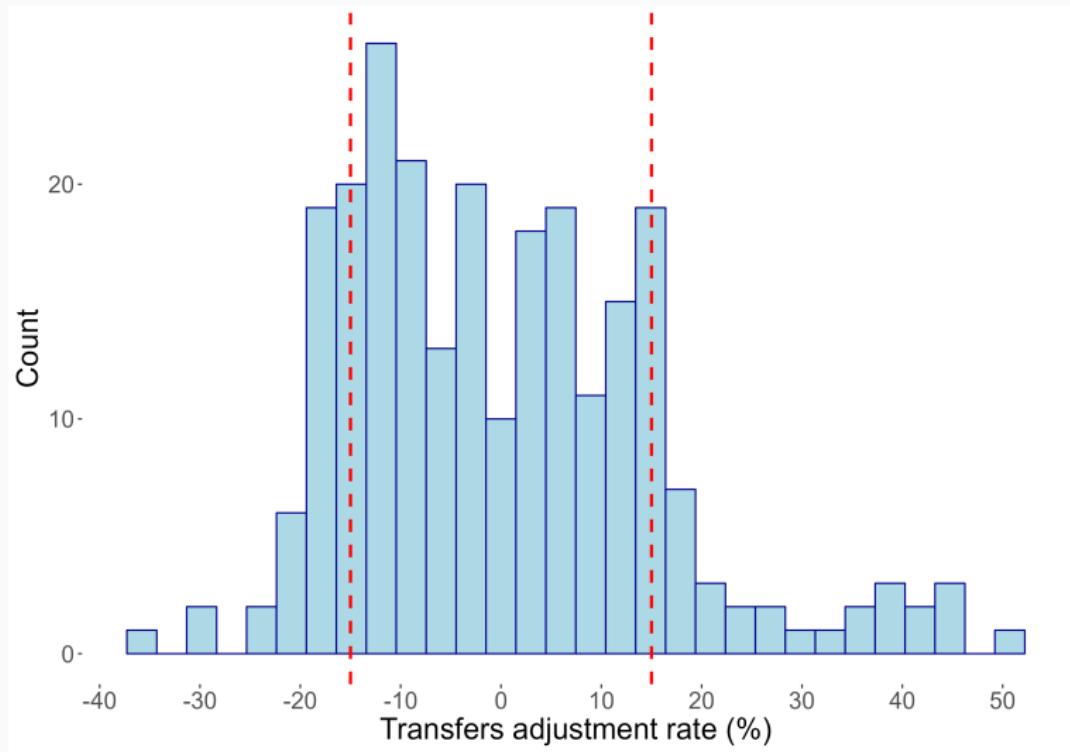
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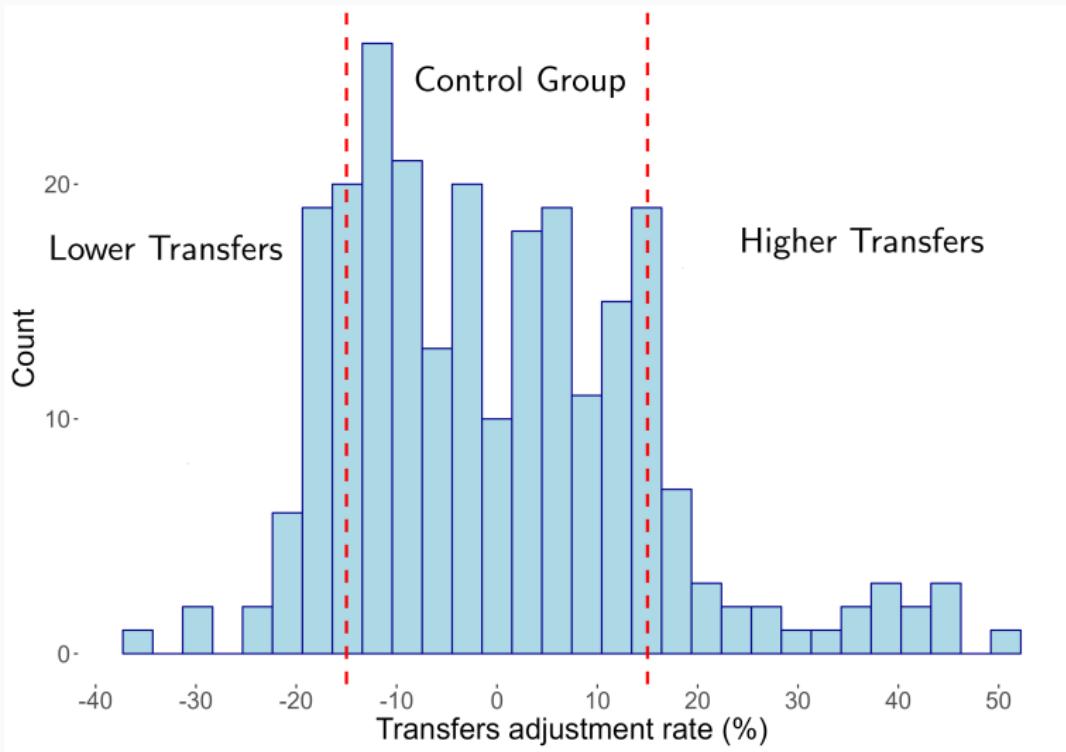
# Transfers adjustments



# Transfers adjustments



# Transfers adjustments



# Municipalities Characteristics by Treatment Groups

	Control (1)	High Transfers (2)	Low Transfers (3)	(2)-(1) (4)	(3)-(1) (5)
<i>Panel A: Development</i>					
Population	19179.77 (20547.64)	36962.26 (35483.34)	13942.30 (21141.76)	17782.49** (6560.61)	-5237.47 (3808.79)
Poverty(%)	28.96 (12.59)	22.40 (9.44)	26.05 (10.67)	-6.56*** (1.95)	-2.91 (2.00)
Public Schools Enrollment	3340.88 (3123.40)	7748.29 (7021.30)	1726.81 (2700.15)	4407.41*** (1283.10)	-1614.07*** (503.11)
Night Light Radiance	0.34 (0.65)	0.55 (0.93)	0.17 (0.15)	0.22 (0.18)	-0.17*** (0.06)
<i>Panel B: Financial</i>					
Tax Revenues	1137.10 (2441.98)	3089.38 (3749.98)	991.31 (1885.51)	1952.28*** (698.49)	-145.79 (361.05)
Total Revenues	4810.61 (5954.81)	11305.06 (17031.61)	3356.71 (3942.38)	6494.45** (3092.10)	-1453.90* (789.85)
Number of Municipalities	174	37	31		

# Municipalities Characteristics by Treatment Groups (Political)

	Control (1)	High Transfers (2)	Low Transfers (3)	(2)-(1) (4)	(3)-(1) (5)
<i>Panel C: Political</i>					
Voter Turnout (%)	0.65 (0.06)	0.65 (0.06)	0.68 (0.06)	0.00 (0.01)	0.03** (0.01)
City Council Seats	10.47 (1.50)	11.23 (1.33)	9.89 (1.39)	0.76*** (0.27)	-0.57** (0.26)
Governability (%)	0.60 (0.49)	0.39 (0.50)	0.68 (0.47)	-0.21** (0.10)	0.08 (0.09)
Red Party (%)	0.59 (0.49)	0.65 (0.49)	0.68 (0.47)	0.06 (0.10)	0.09 (0.09)
College Mayor (%)	0.49 (0.50)	0.54 (0.51)	0.51 (0.51)	0.04 (0.11)	0.02 (0.09)
Mayor's Age	43.79 (9.86)	42.52 (10.37)	46.43 (12.09)	-1.28 (2.01)	2.64 (2.12)
Mayor's Gender = Male	0.91 (0.29)	0.97 (0.18)	0.84 (0.37)	0.06 (0.04)	-0.07 (0.07)
Number of Municipalities	174	37	31		

## Identification Strategy

For every municipality  $i$ , at time  $t$ :

$$Y_{it} = \beta_0 + \beta_1 Low_i \times Post_t + \beta_2 High_i \times Post_t + \gamma X_{it} + \phi_t + \psi_i + \varepsilon_{it}$$

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where  $Post_t$  is an indicator for the years after the Census Adjustment (2016 onwards)

$\gamma_t$ : year fixed effects

$\psi_i$ : municipality fixed effects

## Event Study Design

For each municipality  $i$ , we estimate separate dynamics for high and low transfer municipalities:

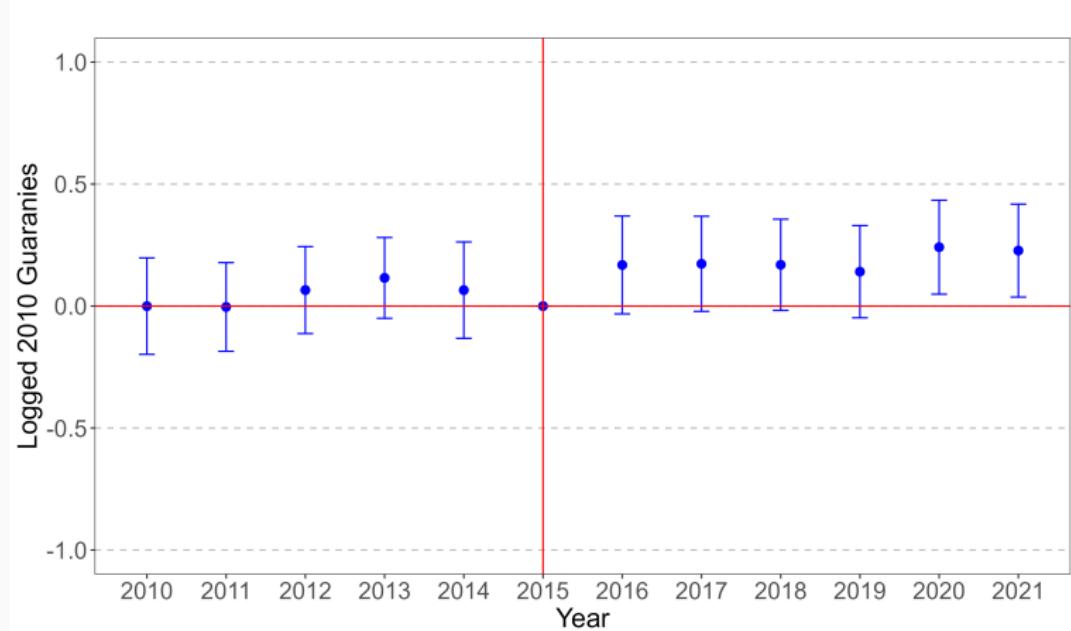
$$Y_{it} = \sum_{\substack{j=2005 \\ j \neq 2015}}^{2021} \beta_j \text{High}_i \cdot \mathbf{1}(t = j) + \gamma_t + \psi_i + \varepsilon_{it}, \quad (1)$$

$$Y_{it} = \sum_{\substack{j=2005 \\ j \neq 2015}}^{2021} \beta_j \text{Low}_i \cdot \mathbf{1}(t = j) + \gamma_t + \psi_i + \varepsilon_{it}, \quad (2)$$

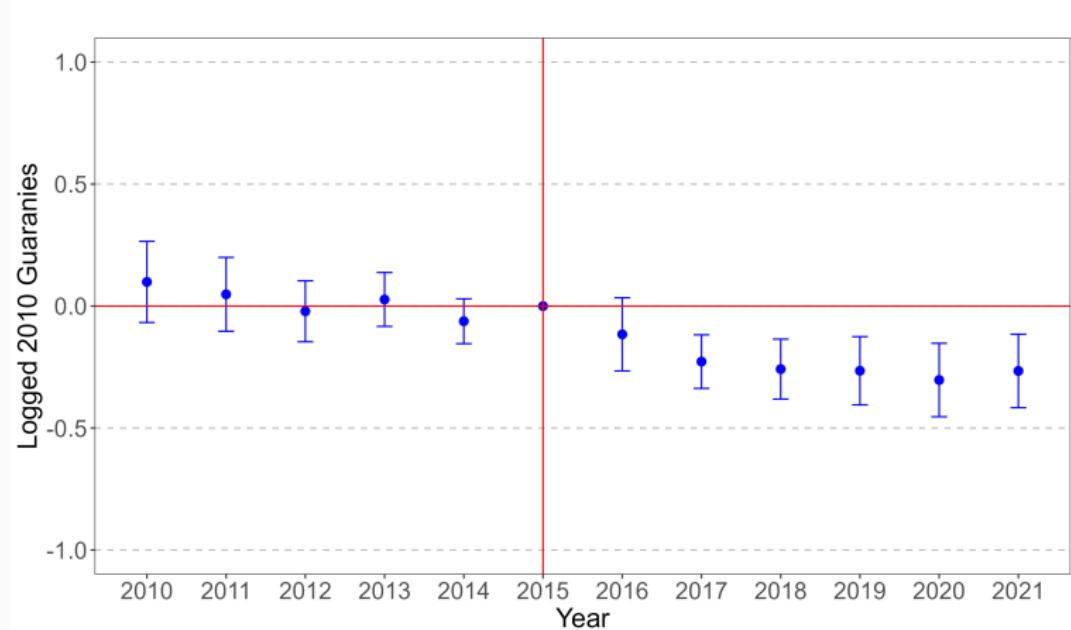
where:

- $\gamma_t$ : year fixed effects
- $\psi_i$ : municipality fixed effects
- $\beta_j$ : coefficients capturing the effect of transfers relative to the baseline year 2015

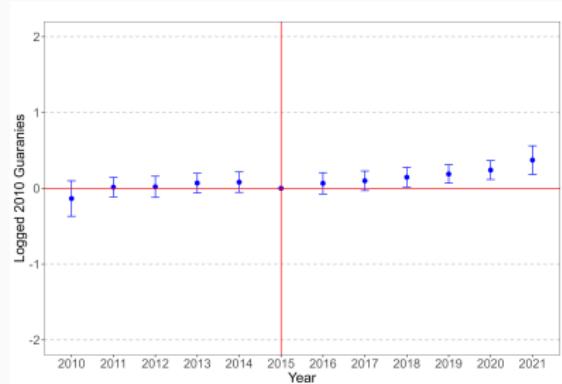
## Effect on Tax Revenues - Low Group



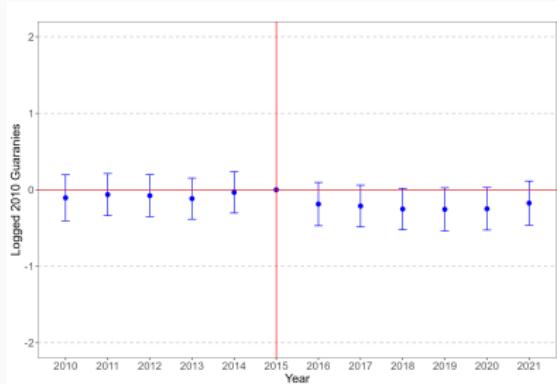
## Effect on Tax Revenues - High Group



# Event Study: Total Expenditures



**Figure 2:** Low Transfers  
Municipalities



**Figure 3:** High Transfers  
Municipalities

# DiD Estimates: Enrollment in Public Schools

<i>Panel A: Enrollment in Public Schools (Municipality Level)</i>			
	Total (1)	Urban (2)	Rural (3)
Lower Transfers	0.0077 (0.0253)	0.0176 (0.0578)	-0.0045 (0.0338)
Higher Transfers	-0.0020 (0.0271)	-0.1052 (0.0654)	-0.0790 (0.0852)
Num. Obs.	2625	2625	2625
Mean DV Low Treat	1727	824	903
Mean DV High Treat	7748	4615	3133

*Notes:* Panel A reports results for total, urban, and rural public school enrollment. All regressions include municipality and year fixed effects and controls for population, mayor's age, mayor gender, and city council alignment. Standard errors clustered at the municipality level.

## DiD Estimates: Night Lights Radiance

<i>Panel B: Night Lights Radiance (Municipality Level)</i>		
	Max	Year Avg.
Lower Transfers	-0.0464 (0.0290)	-0.0220 (0.0344)
Higher Transfers	0.0809** (0.0403)	0.0627 (0.0391)
Num. Obs.	2066	2066
Mean DV Low Treat	0.17	0.17
Mean DV High Treat	0.55	0.55

Notes: Panel B reports results for night lights radiance (2012–2020). Column (1) uses maximum radiance per year; Column (2) uses annual average. Regression controls and clustering as in Panel A. \* p < 0.1, \*\* p < 0.05.

# Mayor Career and Education

**Table 1:** DiD Estimates for Mayor Career and Education Outcomes

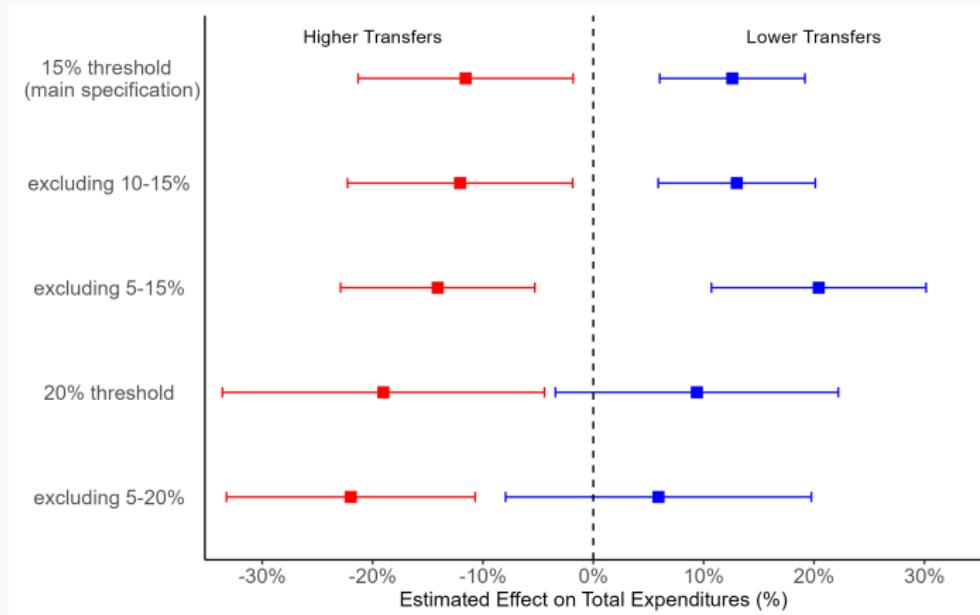
	<i>Dependent Variable</i>			
	<i>Running Again</i> (1)	<i>Reelection Mayor</i> (2)	<i>Future Position in Central Gov.</i> (3)	<i>College Degree</i> (4)
Lower Transfers	0.0231 (0.0445)	0.0587 (0.0661)	-0.0056 (0.0759)	0.1364* (0.0705)
Higher Transfers	-0.0502 (0.0411)	-0.0645 (0.0736)	0.1265* (0.0728)	-0.1449* (0.0870)
Num. Obs.	1210	1210	968	1210
Mean DV Low Treat	0.10	0.07	0.05	0.53
Mean DV High Treat	0.16	0.11	0.11	0.54

*Notes:* \* p < 0.1, \*\* p < 0.05, \*\*\* p < 0.01. All regressions include municipality and election-window fixed effects, as well as controls for population, mayor's age, gender, and council-party alignment. Standard errors clustered at the municipality level.

## Robustness Checks Figures

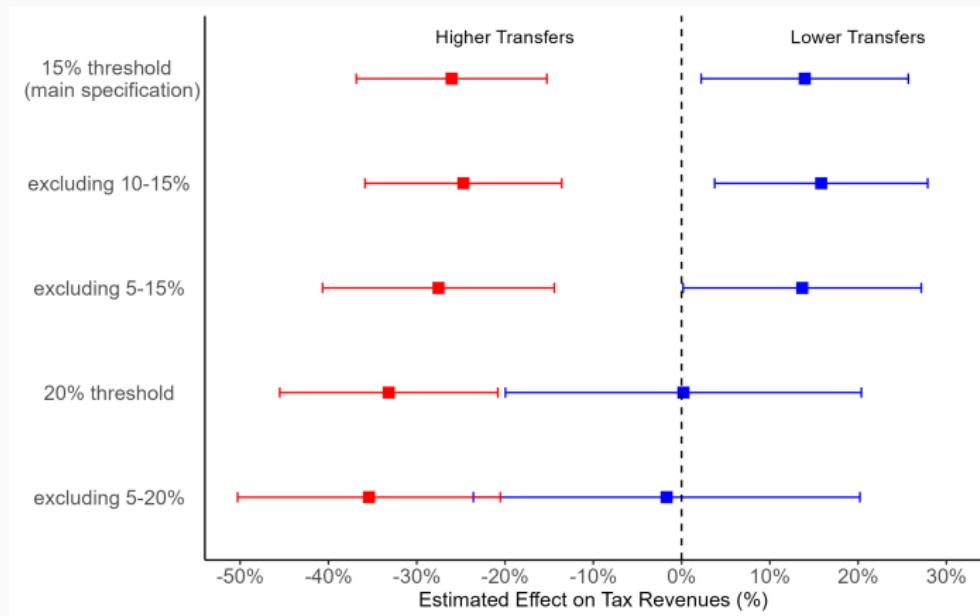
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# Robustness Check: Total Expenditures



Effect on total expenditures

# Robustness Check: Tax Revenues



Effect on tax revenues

## Conclusions - Fiscal Effects

- Exploiting exogenous variation in population-based transfers in Paraguay reveals clear **crowding effects**:

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  - **Tax revenues:** increase 14% in low-transfer municipalities, decrease 24% in high-transfer municipalities.

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- Exploiting exogenous variation in population-based transfers in Paraguay reveals clear **crowding effects**:
  - **Tax revenues**: increase 14% in low-transfer municipalities, decrease 24% in high-transfer municipalities.
  - **Expenditures**: increase 15% in low-transfer municipalities, decrease 14% in high-transfer municipalities.
- **Political economy mechanisms** might be driving these effects (suggestive evidence):
  - When municipalities need to increase politically costly taxes, mayors follow up with more expenditures.
  - Municipalities that decrease taxes can afford to spend less.
- **Local development effects** are limited or negligible.

## Conclusions - Political Effects

- **Political career effects:**
  - Mayors in high-transfer municipalities are more likely to pursue positions in central government. (noisy estimates)
  - No significant career change for mayors in low-transfer municipalities.
- **Mayor's education effects:**
  - Lower Transfers group: more likely to have a new mayor with a college degree (+13 pp)
  - Higher Transfers group: less likely to have a mayor with a college degree (-14 pp)
- Overall, highlights the interplay of **fiscal incentives, political considerations, and local development**, offering lessons for designing effective transfer systems.