How the Political Power of Teacher Unions Affects Education

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Teacher Unions in Developing Countries

- How teacher unions affect education is ambiguous (Hoxby (1996))
  - Lobbying for better education inputs
  - Rent seeking for their own interests
- Teacher unions in developing countries have political power (Moe and Wiborg (2017))
  - Local teachers can influence voters
  - Government cannot ignore because they are useful for winning elections
  - Amplify both effects above

- **Research Question**
  Does the political power of teacher unions explain low quality of education?

Research Context: Mexico

- Politically powerful teacher union: SNTE
  - Formed alliance with the ruling parties for a long time
  - Suggestive evidence that **SNTE can sway votes** (Larreguy and Marshall (2016); Larreguy, Montiel Olea and Querubin (2017))

- Mexican education in comparison with OECD countries (Santiago et al. (2012); OECD (2019))
  - Higher share of GDP on education
  - Lower achievement levels

What We Do

1. We study **an example of what SNTE can do with political power**
   - Reward teachers for electoral contribution
   - Manipulation of a pay-for-performance program
2. We look at **how it affects education outcomes**
   - Test scores on a national standardized exam

- **Difference-in-Differences estimation**: compare municipalities...
  - Before/After the 2006 presidential election
  - High/Low vote shares for the candidate SNTE supported

What We Find

- After the election, schools in municipalities with **higher vote shares** have...
  - **more** teachers incorporated in the pay-for-performance program (2%)
  - **more** teachers promoted in the pay-for-performance program (8%)

- For learning outcomes, those schools have...
  - **lower** scores in a national standardized test (0.06 SD)
  - **more** students in the bottom achievement level (5%)
  - **no change** in the top achievement level

Teacher Unions in Mexico

- SNTE
  - The biggest teacher union in Mexico
  - All public school teachers at basic education (Grade 1 to 9)
  - Estimated number of members more than 1 million (Santibanez and Rabling (2008))

- Other union: CNTE
  - A dissident teacher union
  - Against political involvement of SNTE

2006 Presidential Election

- Incumbent party PAN won the presidency
  - Winning margin was 0.6 ppt ($\approx$ 240,000 votes)
- SNTE publicly announced their support for PAN in 2005
  - Convince people to vote for PAN locally (Larreguy, Montiel Olea and Querubin (2017))
- SNTE claimed the credits for the win and received favor from the new government (Chambers-Ju and Finger (2016))

Pay-for-Performance Program

- Carrera Magisterial (CM, 1993 - 2015)
  - Aimed to give monetary bonuses to well-performing teachers at public schools
  - Participation is voluntary and not forced to exit or downgrade once in CM
  - Governed by a committee composed of SNTE and state education authority

- Qualitative study suggests **CM is a patronage tool for SNTE**
  - Teachers believe merit points will be given if they are loyal to SNTE, regardless of whether they deserve them or not (Hecock (2014))
  - SNTE used CM to award salary raises to teachers who were loyal to it (Chambers-Ju and Finger (2016))

Difference-in-Differences Estimation

For school i in municipality m in year t,

$$Y_{imt} = \beta_t \times \text{High PAN VS}_{m,2006} \times \mathbf{1}\{t \geq 2006\} + \gamma_i + \gamma_{g(i)s(m)t} + \varepsilon_{imt}.$$

- Y_{imt} : Total # of teachers in CM, the # of promoted teachers in CM
- High PAN $\text{VS}_{m,2006}$: 1 if vote shares for PAN in $m >$ median vote share
- γ_i : School-shift fixed effects
- $\gamma_{g(i)s(m)t}$: School-type ($g(i)$) by state ($s(m)$) by year fixed effects

Identifying assumption

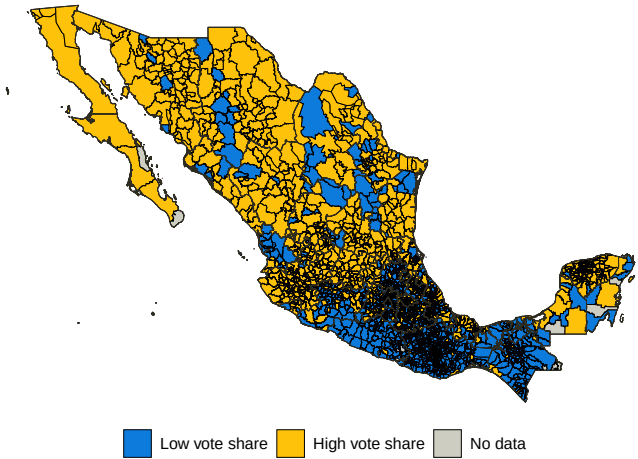
Incorporation and promotion in CM would trend similarly across municipalities without the presidential election.

Data and Sample

- School censuses from 1998-1999 to 2018-2019
  - Detailed information about students and teachers
- Data on presidential elections for 2000, 2006, 2012, 2018
  - Vote shares at municipality level
- Supplementary data
  - Population Census in 2005

- Sample restrictions
  - General and televised secondary schools ($\geq$ 80% of total)
  - About 27,000 schools in each year

Distribution of Municipalities



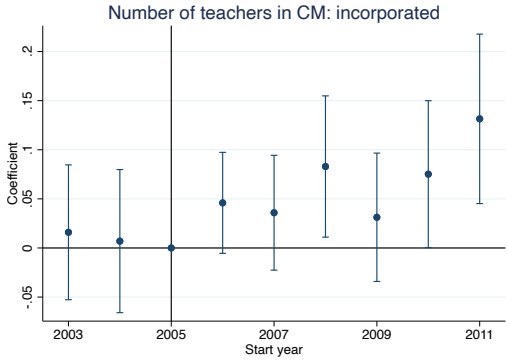
Municipality Characteristics in 2005

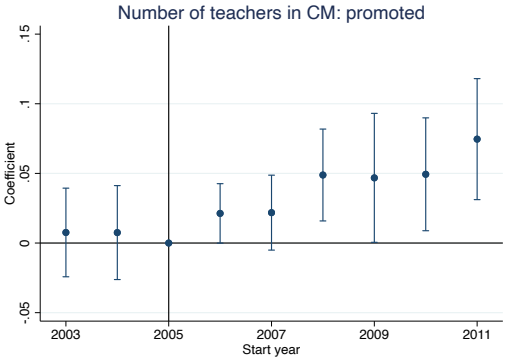
	High vote share	Low vote share	p-val
Total population	57307	30211	0.000***
Male (share)	0.482	0.478	0.000***
Age 15 to 60 (share)	0.551	0.527	0.000***
Age above 60 (share)	0.102	0.109	0.000***
Indigenous (share)	0.094	0.239	0.000***
No formal education (share)	0.078	0.118	0.000***
Primary education (share)	0.317	0.308	0.001***
Secondary education (share)	0.127	0.107	0.000***
High school or higher (share)	0.123	0.095	0.000***
Number of schools	13.905	9.322	0.000***
Public schools (share)	0.932	0.970	0.000***
Televised schools (share)	0.685	0.796	0.000***

Public School Characteristics in 2005

	High vote share	Low vote share	p-val
Teachers in CM	2.314	1.788	0.000***
Promoted teachers in CM	0.580	0.431	0.000***
Total enrollment	176.383	144.041	0.000***
Number of teachers	7.411	5.883	0.000***
Teachers with graduate degrees	0.409	0.223	0.000***

Dynamic Effects on CM





	Total # of teachers in CM			# of teachers in CM: promoted		
2003-2005 × High vote share	0.0118	-0.00884	-0.00579	0.00755	0.00396	0.00409
	(0.0325)	(0.0273)	(0.0272)	(0.0137)	(0.0130)	(0.0130)
2006-2008 × High vote share	0.0414	0.0384	0.0368	0.0216*	0.0170	0.0168
	(0.0260)	(0.0250)	(0.0247)	(0.0114)	(0.0109)	(0.0109)
2008-2010 × High vote share	0.0576*	0.0323	0.0302	0.0478***	0.0371**	0.0368**
	(0.0309)	(0.0303)	(0.0300)	(0.0185)	(0.0178)	(0.0177)
2010-2012 × High vote share	0.104***	0.0647*	0.0587	0.0618***	0.0460**	0.0452**
	(0.0395)	(0.0387)	(0.0378)	(0.0205)	(0.0215)	(0.0213)
Municipality control	No	Yes	Yes	No	Yes	Yes
Student control	No	No	Yes	No	No	Yes
Obs.	166863	166863	166863	166863	166863	166863
R^2	0.881	0.882	0.883	0.789	0.789	0.790
Dep mean			2.314			0.580

Note: Clustered standard errors (municipality) in parentheses.

School-shift FEs and school-type-state-year FEs are included in all specifications.

Dep mean is mean of dependent variables for schools in high vote share municipality in 2005.

*** p<0.01 ** p<0.05 * p<0.1

- 5 years after the election, schools in high-vote-share municipalities have...
  - 0.06 person (or 2%) more teachers in CM
  - 0.05 person (or 8%) more teachers promoted in CM

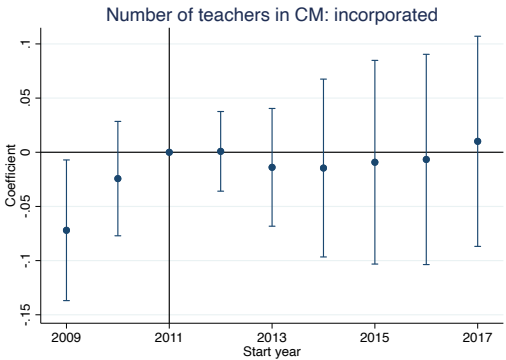
- Our hypothesis
  - Higher vote shares $\Rightarrow$ Perceived as more loyal $\Rightarrow$ More reward
  - Possible only when SNTE has connection to government

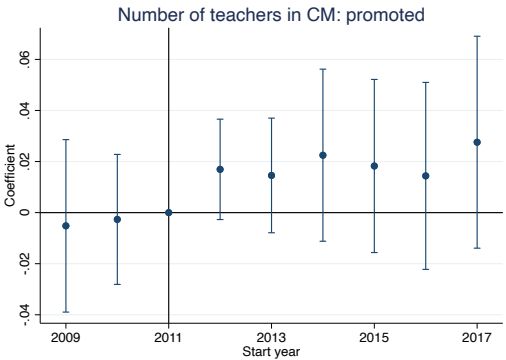
Robustness Checks: 2012 Presidential Election

- PRI won the 2012 presidential election
  - SNTE provided electoral support to PRI
  - But the new president distanced PRI from SNTE
  - The leader of SNTE arrested in 2013

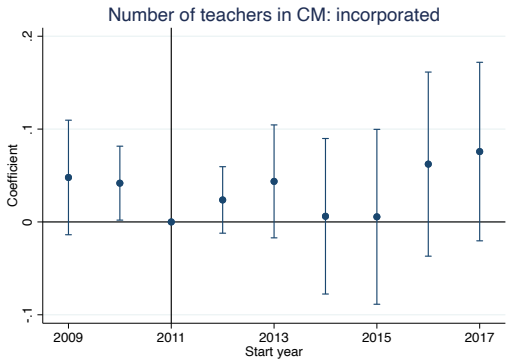
- We test whether our effects were driven...
  - solely by PAN
  - solely by SNTE or the winning party

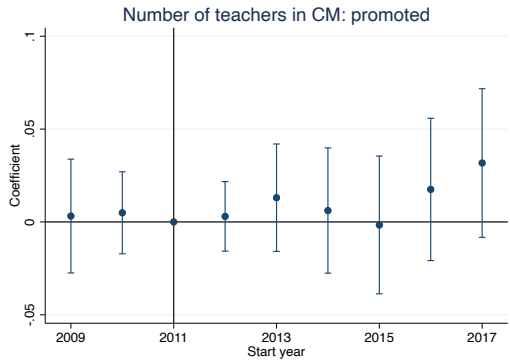
$$Y_{imt} = \beta_t \times \text{High PAN VS}_{m,2012} \times \mathbf{1}\{t \geq 2012\} + \gamma_i + \gamma_{g(i)s(m)t} + \varepsilon_{imt}$$





$$Y_{imt} = \beta_t \times \text{High PRI VS}_{m,2012} \times \mathbf{1}\{t \geq 2012\} + \gamma_i + \gamma_{g(i)s(m)t} + \varepsilon_{imt}$$





Robustness Checks: Placebo Outcomes

	# of teachers		# of grad teachers		Enrollment	
2003-2005 × High vote share	-0.0159	0.00631	0.00891	0.0100	-0.473	-0.682
	(0.0327)	(0.0325)	(0.0111)	(0.0109)	(0.702)	(0.592)
2006-2008 × High vote share	-0.0323	-0.0164	0.0103	0.00976	0.362	0.256
	(0.0292)	(0.0304)	(0.0114)	(0.0118)	(0.577)	(0.551)
2008-2010 × High vote share	0.0724	0.0418	0.0228	0.0180	0.949	0.393
	(0.0505)	(0.0411)	(0.0144)	(0.0148)	(0.987)	(0.931)
2010-2012 × High vote share	-0.0657	-0.0405	0.0484**	0.0310	2.057	1.461
	(0.0706)	(0.0645)	(0.0206)	(0.0201)	(1.339)	(1.287)
Municipality control	No	Yes	No	Yes	No	Yes
Obs.	166863	166863	166863	166863	166863	166863
R^2	0.955	0.955	0.648	0.649	0.982	0.982

Note: Clustered standard errors (municipality) in parentheses.

School-shift FEs and school-type-state-year FEs are included in all specifications.

Dep mean is mean of dependent variables for schools in high vote share municipality in 2005.

*** p<0.01 ** p<0.05 * p<0.1

Other Robustness Checks

- Different measures of main independent variable
  - Continuous vote shares
  - Mean vote shares
  - Include full pre-periods
- Heterogeneity in states controlled by dissident teacher unions
  - Cannot reject main effects are absent
- Granular geographic fixed effects
  - Replace state with electoral districts ($= 300$).
- Use state-level elections to replicate main effects
  - Work in progress!

Reduced-Form Effects on Test Scores

- ENLACE (2005-2006 to 2013-2014)
  - A national standardized exam for basic education
  - Grade 9 participated in all years while Grade 7 and 8 did since 2008-2009
  - Subjects are Spanish, Math, and a rotating subject
  - Standardized to have national mean at 500 and SD at 100
  - Linked to CM since 2008-2009

- Limitation
  - Results are for grade 9
  - Only one pre-period before the election

	Average score: Spanish	Average score: Math
2006-2008 × High vote share	-0.0913	0.695
	(1.362)	(1.491)
2008-2010 × High vote share	-3.235**	-0.416
	(1.625)	(1.826)
2010-2012 × High vote share	-6.481***	-6.913**
	(2.188)	(2.773)
Obs.	118851	118851
R^2	0.509	0.516
Dep mean	471.7	487.5

Note: Clustered standard errors (municipality) in parentheses.

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	Bottom achievement (N)		Top achievement (N)	
	Spanish	Math	Spanish	Math
2006-2008 × High vote share	0.120	0.529*	-0.0155	-0.0176
	(0.280)	(0.310)	(0.0187)	(0.0220)
2008-2010 × High vote share	0.653**	0.687**	-0.0219	-0.0155
	(0.316)	(0.349)	(0.0217)	(0.0533)
2010-2012 × High vote share	1.239***	1.348***	-0.0501	-0.106
	(0.397)	(0.480)	(0.0418)	(0.167)
Obs.	118880	118880	118880	118880
R^2	0.865	0.910	0.445	0.411
Dep mean	19.98	29.38	0.207	0.109

Note: Clustered standard errors (municipality) in parentheses.

School-shift FEs and school-type-state-year FEs are included in all specifications.

Dep mean is mean of dependent variables for schools in high vote share municipality in 2005.

*** p<0.01 ** p<0.05 * p<0.1

No Effects for Private Schools

	Avgerage score: Spanish	Avgerage score: Math
2006-2008 × High vote share	4.713	2.043
	(3.956)	(3.630)
2008-2010 × High vote share	0.470	-3.466
	(4.180)	(4.575)
2010-2012 × High vote share	2.925	-0.558
	(4.274)	(5.457)
Obs.	18868	18868
R^2	0.686	0.674
Dep mean	571.2	570.1

Note: Clustered standard errors (municipality) in parentheses.

School-shift FEs and school-type-state-year FEs are included in all specifications.

Dep mean is mean of dependent variables for schools in high vote share municipality in 2005.

*** p<0.01 ** p<0.05 * p<0.1

	Bottom achievement (N)		Top achievement (N)	
	Spanish	Math	Spanish	Math
2006-2008 × High vote share	0.101	0.219	0.360	0.230
	(0.613)	(0.706)	(0.336)	(0.283)
2008-2010 × High vote share	0.410	0.639	0.268	-0.0178
	(0.933)	(0.891)	(0.259)	(0.261)
2010-2012 × High vote share	0.819	1.025	0.298	0.483
	(1.066)	(0.901)	(0.304)	(0.587)
Obs.	18871	18871	18871	18871
R^2	0.648	0.761	0.747	0.669
Dep mean	5.130	9.876	1.575	0.805

Note: Clustered standard errors (municipality) in parentheses.

School-shift FEs and school-type-state-year FEs are included in all specifications.

Dep mean is mean of dependent variables for schools in high vote share municipality in 2005.

*** p<0.01 ** p<0.05 * p<0.1

Summary

- We show the teacher union in Mexico rewarded teachers for electoral support after the presidential election by using a pay-for-performance program.
- We further show suggestive negative effects on learning outcomes for schools in municipalities with high vote shares for the candidate the union supported.
- We are working on connecting these two sets of results.

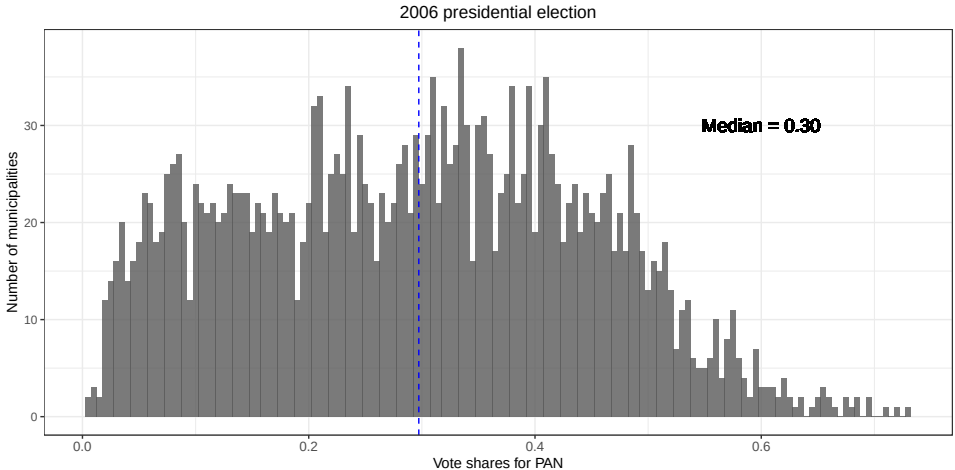
CM systems

	Merit points		
Factors	1993	1998	2011
Student performance	7	20	50
Continuous training	15	17	20
Academic degrees	15	15	-
Professional preparation	25	28	5
Peer review	28	10	-
Seniority	10	10	5
Co-curricular activities	-	-	20

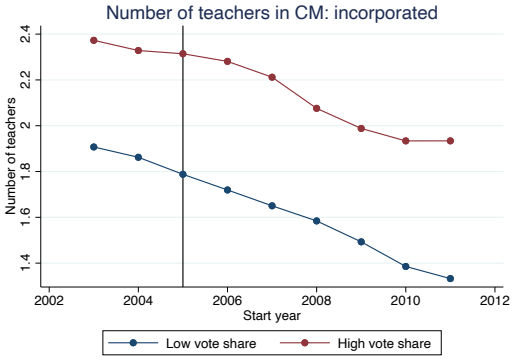
	Bonus/Base in % (2008)	
Levels	Primary	Secondary
A	27	27
B	60	61
C	104	104
D	153	153
E	215	217

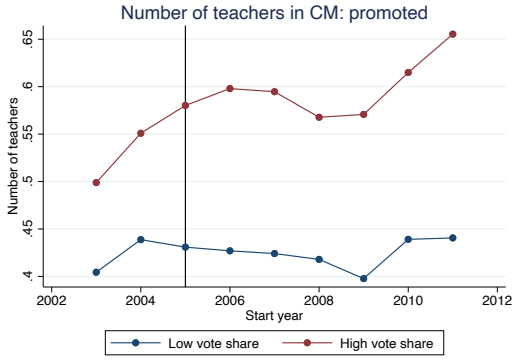
Tables from Santiago et al. (2012)

Distribution of Vote Shares for PAN



Trends of CM Participation





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