

Teachers, Electoral Cycles and Learning in India

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Background

- Teachers important for education (Glewwe, 2014).
- Public sector schools operate in the context of political systems.
- Transfers/hiring can be influenced by political factors (India - Béteille, 2009, Kingdon et al., 2014).
- Literature on electoral cycles in public sector resources (e.g. Drazen, 2001, Khemani, 2004).
- Studies on effects of electoral cycles on teachers or learning scarce.
- Bureaucrats: Iyer and Mani (2007, 2012), Bertrand et al. (2015).

Our study

- Focus: State Assembly Elections, timing pre-determined.
- Transfers of Indian public primary school teachers and new hires rise in the post-election period.
- Electoral cycle also affects learning. Separate data source.
- Timing of effects suggests connection →
political cycles in management of teachers can have performance implications.
- Various robustness checks.

Teacher transfers and recruitment in India

- Core decisions on recruitment of teachers at state level.
- Transfer policies often not clear, variation by state (Sharma & Ramachandran, 2008, World Bank & NUEPA study).
- Transfers can:
 - be based on request
 - be disciplinary
 - take place on a mass basis.

Why might electoral cycle matter for transfers and hiring?

- Post-election momentum by government. Anecdotal evidence for Rajasthan (Sharma & Ramachandran, 2009), Iyer & Mani (2007).
- Model Code of Conduct (Election Commission):
 - Bans transfers/appointment of government employees connected with election duties.
- *“Imposition of model code of conduct for assembly elections had also delayed teacher recruitment in Bihar and Haryana”* (Jha et al., 2008).

Data: Teachers

- District Information System for Education (DISE), National University of Educational Planning and Administration (NUEPA).
- Administrative school records database. Reported by schools.
- Panel dataset of schools for 2005-2011.
- Includes variables on school resources, management and pupils.
- **Teacher level file** with information on each teacher and key characteristics: name, age, caste, gender, date of birth, tenure and educational qualifications.

Data: Learning

- Annual Status of Education Report (ASER): Annual survey of rural children, carried out since 2005.
- Repeated cross-section of household surveys, 2005-2012.
- Reading and Numerical skills of children, carried out at home.

Reading skills: ability to read a story (5), paragraph (4), sentence (3), a word (2), or nothing (1).

Numerical skills: ability to divide (4), subtract (3), recognise a number (2), or nothing (1).

- Representative at district level.

Data: Elections

- State Assembly Elections.
- Data for 1999-2012 from the Election Commission of India.
- By constitution, Assembly Elections carried out in each state every five years.
- Cycle is different across states. Every year elections in some states → enables identification of the effects.
- IV models: in few cases, elections held early/late. Instrument the timing with original, scheduled election cycle. (Khemani, 2004 and Cole, 2009).

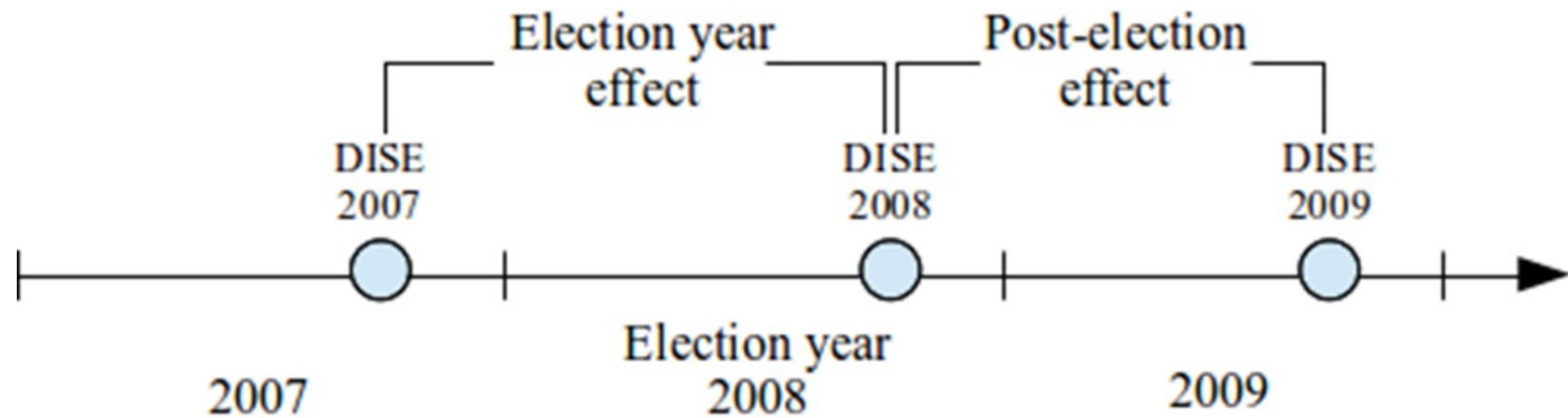
Teachers: Variables

- Lower primary school teachers in non-private schools, age 18-55.

Key outcomes:

- **Transfers**: dummy for whether teacher leaves school in a particular year.
 - Teacher identifier based on gender and date of birth.
- **Number of teachers**: regular & contract teachers.
- **Number of new teachers** hired per year in a district.
- Number of days on **non-teaching assignments** per teacher in school.

Timing of the teacher data and elections



Estimation: Electoral cycle and teachers

$$Outcome_{it} = \sum_y \beta_y D_{ys} + \lambda_t + \tau_s t + \alpha_i + u_{it} \quad t \in [2005, 2011] \quad y \in [1, 5]$$

- i - school, s - state, t - years.
- D_{ys} - dummies corresponding to the election phases.
- y - number of years from the latest election:
1 - post-election year, 5 - election year.
- Reference category: three years after the elections ($y = 3$).
- Coefficients of interest: β coefficients.
- **Standard errors clustered at the state level.**

Summary statistics: Teachers

	Obs.	Mean	S.D.	Min	Max
Teachers exits school (transfer)	9546949	.171	.376	0	1
Female	9546949	.411	.492	0	1
Age	9546949	38.5	8.8	18	55
Newly hired teacher	9546949	.047	.211	0	1
Election phase:					
1 – Post-election year	9546949	.205	.404	0	1
2	9546949	.215	.411	0	1
3	9546949	.192	.394	0	1
4	9546949	.198	.399	0	1
5 – Election year	9546949	.189	.391	0	1

Source: DISE 2005-2010. Pooled sample. Observations for 2011 are excluded as the teacher transfer variable cannot be calculated for the final year (as it is defined as the last year that a teacher is observed in a school).

Summary statistics: Schools

	Obs.	Mean	S.D.	Min	Max
# of Teachers	4929221	2.76	1.80	0	59
# of Formal teachers	4929221	2.31	1.83	0	59
Days on non-teaching assignments	4929147	2.3	11.1	0	365
Election phase:					
1 – Post-election year	4929221	.200	.400	0	1
2	4929221	.209	.406	0	1
3	4929221	.203	.402	0	1
4	4929221	.203	.402	0	1
5 – Election year	4929221	.185	.388	0	1

Results: Teachers, IV estimates

	[1] Transfer	[2] # of Teachers	[3] Non-teaching assignments (days)
[4]	.0697 [.0418]	.0717 [.0482]	.1330 [.28]
[5] 'Election year'	.0207 [.0185]	.0209 [.0703]	.3130 [.286]
[1] 'Post-Election year'	.0917** [.0208]	.0165 [.0601]	.4710 [.404]
[2]	.0065 [.00903]	.0476* [.023]	.5940 [.337]
Data	Teacher-level	School-level	School-level
Observations	9507638	4813102	4813054
R-squared	.022	.040	.011

Notes: All models include school fixed effects, state trends and year effects. In column [1] the model is estimated using individual teacher data and the dependent variable is a dummy indicating that the teacher is being observed in the school for the last year. The sample includes formal teachers in non-private schools who are between 18-55 years old. Column [2] is based on school-level data and includes para-teachers. Standard errors are clustered at the state level. (+, *, **) refer to statistical significance at 10%, 5% and 1% levels, respectively.

New hires, IV estimates (2005-2011), District panel

	[1]	[2]
	# New teachers	
	Linear	Log
[4]	97.1	.00126
	[72.8]	[.223]
[5] 'Election year'	36.2	.116
	[43.6]	[.298]
[1] 'Post-Election'	25.1	-.0831
	[33.8]	[.235]
[2]	130*	.376
	[65.1]	[.303]
Observations	4103	4103
R-squared	.148	.151
Number of Districts	598	598

Notes: All models include district fixed effects, state trends and year effects. In the logarithmic transformation a 1 is added to all numbers to avoid losing log(0) observations. Standard errors are adjusted for state level clustering. (+, *, **) refer to statistical significance at 10%, 5% and 1% levels, respectively.

Electoral cycle and learning

- Can the observed post-election re-organisation of teachers disrupt the school system to affect learning?
- Pupil level test scores (ASER) matched with the timing of the elections by calendar year. ASER: late Autumn.
- 4th graders: all avoided a specific election phase. Approx. one fifth have not experienced elections during their time in school.

Estimation: Electoral cycle and learning

$$zscore_{itd} = A_i + Female_i + \Lambda_t + \Omega_d + \beta Miss_y + u_{it}$$

$$t \in [2005, 2012] \quad y \in [1, 5]$$

- Age-specific z-scores for each pupil in both Reading and Mathematics, normalised with respect to ASER 2005.
- Coefficient of interest: $Miss_y$ dummy: whether pupil not attending school in the year that begins over a certain phase of the election cycle (y).
- Dummies (A_i): number of years that pupil is over or under aged for the grade. Also gender, survey year (Λ_t), and district effects (Ω_d).

Summary statistics: ASER, 2005-12, 4th graders

	Obs.	Mean	S.D.	Min	Max
Read nothing	408677	.034	.182	0	1
Read word	408677	.105	.306	0	1
Read sentence	408677	.187	.390	0	1
Read paragraph	408677	.283	.451	0	1
Read story	408677	.390	.488	0	1
Reading z-score	408677	.103	.924	-3.15	2.51
Maths nothing	406532	.044	.205	0	1
Maths number	406532	.363	.481	0	1
Maths subtract	406532	.346	.476	0	1
Maths divide	406532	.247	.431	0	1
Maths z-score	406532	.104	.900	-2.34	3.08
Female	423629	.456	.498	0	1
Age	427218	9.60	1.37	6	14
Private school	422740	.211	.408	0	1
Current election phase					
1 – Post-election year	427218	.195	.396	0	1
2	427218	.191	.393	0	1
3	427218	.196	.397	0	1
4	427218	.216	.411	0	1
5 – Election year	427218	.203	.402	0	1

Coverage: 562 districts in 28 states

Learning: Five treatments

	[T1]	[T2]	[T3]	[T4]	[T5]
	Experienced phases of the cycle				
Grade 1	1	2	3	4	5
Grade 2	2	3	4	5	1
Grade 3	3	4	5	1	2
Grade 4	4	5	1	2	3

Notes: Phase 5, the election year is highlighted. Treatment T1 means that the pupil begins school, and enters grade 1 in phase 1 of the election cycle, or one year after the election year.

Learning: Results, IV estimates

	[1]	[2]	[3]	[4]
	Government		Private	
	Reading	Maths	Reading	Maths
Treatment / Election phase missed				
T2 / Miss school year beginning in the post-election year	.0843*	.115**	.0133	.0481+
	[.0362]	[.0409]	[.0221]	[.0273]
T3 / ..phase 2	-.0130	-.0131	-.0017	-.0114
	[.0263]	[.0278]	[.0139]	[.0162]
T4 / ..phase 3	-.0719**	-.0703**	-.0188	-.0320
	[.026]	[.0267]	[.024]	[.0287]
T5 / ..phase 4	.0056	-.0191	-.0108	-.0047
	[.025]	[.022]	[.017]	[.0171]
T1 / Miss school year beginning in the election year	.0064	.0004	.0164	-.0020
	[.0254]	[.0302]	[.0191]	[.0199]
Observations	317762	316104	83699	83261
Number of districts	562	562	562	562

Notes: Each row-column cell represents the coefficient from a separate regression model. Each model includes district fixed effects, survey year controls, age and gender controls. Standard errors are clustered at the state level. (+, *, **) refer to statistical significance at 10%, 5% and 1% levels

	Government		Private	
	Reading	Maths	Reading	Maths
Years from election:				
T3 / 1 year from elections	-.0803** [.0214]	-.105** [.0315]	-.0143 [.0206]	-.0485* [.0232]
T4 / 2	-.127** [.0478]	-.151** [.052]	-.0298 [.0379]	-.0678 [.0456]
T5 / 3	-0.0655 [.0473]	-.109* [.0472]	-0.0226 [.028]	-0.045 [.0347]
T1 / 4 years from elections	-.0693 [.0447]	-.101+ [.0521]	-.0007 [.0257]	-.0420 [.0295]
Observations	317762	316104	83699	83261
R-squared	.116	.136	.118	.129
Number of districts	562	562	562	562

Teacher reorganisation & learning?

- Evidence on learning indirect.
- Timing of teacher transfers/reorganisation and lower learning outcomes coincide.
- Electoral cycle has no, or much weaker effect on learning in private schools – source for learning effects is public sector.
- Missing the turbulent year starting in the post-election year has larger effect on learning in districts with higher degree of teacher turnover in the post-election period.

Alternative explanations

- Pupil composition – are 4th graders more likely to attend private schools? No.
- No clear patterns in crime with respect to electoral cycle.
- School resources – effects vary by resource, some increase around elections – unlikely to explain weaker learning in post-election period.

Conclusions

- Reorganisation of the teaching force after State assembly elections in India.
 - Teachers much more likely to be transferred (~50% ↑).
 - Numbers of teachers, new hires rise slightly.
- Pupils who avoid the turbulent phase starting a year after the elections, perform significantly better than others in Reading and Mathematics. Not for private primary schools.
- Teacher reorganisation can be disruptive, potentially due to reduction in effective teaching time, or lower quality of teaching.

- Results on the electoral cycles in teachers and learning can reflect impairments in management (Bloom et al., 2015).
- Also new dimension to literature on the relative effectiveness of private versus public schooling (see e.g. Muralidharan and Sundararaman, 2015 and Singh, 2015).

Learning: Sample split by the intensity of teacher turnover in the Post-election year, IV estimates

	Low β districts	High β districts	Low β districts	High β districts
Treatment				
T2	.0612+ [.0357]	.111** [.0401]	.0911* [.0393]	.148** [.0468]
T3	-.0068 [.0196]	-.0100 [.0409]	-.0125 [.0271]	-.0093 [.0429]
T4	-.063** [.0229]	-.0642* [.0279]	-.0597** [.0179]	-.0617* [.0312]
T5	-.0028 [.0263]	.0004 [.0303]	-.0129 [.0269]	-.0378 [.0252]
T1	.0114 [.0225]	-.0151 [.0438]	-.0047 [.0315]	-.0133 [.0491]
Observations	139679	174137	139030	173176
Number of districts	274	280	274	280

Communal upheaval/crime in a district-level panel, 2005-2012, OLS estimates

Dependents in logs	[1] Murder	[2] Rape	[3] Kidnapping & Abduction	[4] Riots	[5] Arson
Years from election:					
[4]	-.045+ [.0263]	-.008 [.0332]	-.021 [.036]	-.007 [.0312]	.045 [.0578]
[5] 'Election year'	-.035 [.0228]	-.009 [.0359]	.022 [.0455]	.064 [.0418]	.045 [.032]
[1] 'Post-Election'	-.0371+ [.0202]	.020 [.0442]	.028 [.0403]	.027 [.0384]	.046 [.0325]
[2]	-.032 [.0234]	.034 [.0324]	.042 [.0417]	.0869* [.039]	.004 [.0332]
Observations	4626	4626	4626	4626	4626
R-squared	.007	.077	.276	.018	.003
Number of Districts	588	588	588	588	588

Notes: The dependent variable is in logarithmic form and a 1 is added to all numbers to avoid losing log(0) observations. Each model includes district fixed effects and year controls. Standard errors are clustered at the state level. (+, *, **) refer to statistical significance at 10%, 5% and 1% levels. Summary statistics of the data are in Appendix 1.

Effect of election cycle on private school enrolment, pupils in grade 4, IV estimates

Dependent: Attend private school	
[4]	.0008 [.00789]
[5] 'Election year'	.0058 [.0061]
[1] 'Post-Election'	.0046 [.00529]
[2]	-.0058 [.00564]
Observations	424889
R-squared	.012
Number of districts	562

Source: ASER pupil level data for 2005-2012. The dependent variable is a dummy variables. Model controls for gender, district fixed effects and year effects. Standard errors are clustered at the state level. (+, *, **) refer to statistical significance at 10%, 5% and 1% levels.

School Resources and Electoral Cycle, IV

Election cycle phase	Phase 4		Phase 5		Phase 1		Phase 2		Mean of dependent
	Coef	SE	Coef	SE	Coef	SE	Coef	SE	
School Resources									
# of Free textbooks per pupil	.015	.016	.092	.033**	.067	.022**	.056	.032+	.256
# of Free uniforms per pupil	.012	.030	.057	.033+	.066	.034+	.003	.031	.843
# of classrooms per 100 pupils	.003	.078	.212	.147	.213	.104*	.165	.086+	3.93
Girls' toilet	.051	.028+	.054	.028+	.017	.030	-.031	.028	.468
Electricity	-.008	.010	-.020	.011+	.010	.020	.022	.017	.271
Water index	.004	.013	.021	.015	.003	.017	-.025	.018	1.83
Building quality index	-.006	.008	-.024	.015	-.043	.023+	-.012	.011	3.71
Boundary wall	.010	.010	.006	.008	.003	.010	.004	.009	.430
Book bank	-.021	.017	-.053	.029+	-.034	.014*	-.039	.016*	.514
# of Computers per pupil	.038	.020+	.028	.020	.019	.014	.017	.009+	.144
Ramp	-.012	.014	.069	.021**	.072	.015**	.044	.010**	.452
Medical examinations	.014	.017	.007	.019	.040	.010**	.037	.011**	.550
Playground	-.004	.003	-.007	.006	-.010	.010	-.021	.011+	.465