

Double for nothing?

The effects of unconditional teacher salary increases on performance

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Introduction

- Do increases in civil servant salaries lead to improved public service delivery?
 - Salaries are main cost of civil servants
- A relevant question for the education sector in low and middle income countries
 - Education expenditures constitute 17 percent of government expenditure
 - 70 percent of their public education expenditures is spent on teacher salaries
 - Positive correlation between wealth and service delivery measures

Models relating salaries and performance

- **Principal agent models**
 - Field experiments indicate that higher incentivized wages induce performance. Glewwe, Ilias, Kremer (2010) , Muralidharan, Sundararaman (2011) ; Ernst, Goette (2007)
 - But behavior of taxi drivers in New York suggests opposite Camerer, Babcock, Loewenstein , Thaler (1997)
- **Efficiency wages** Shapiro and Stiglitz (1984)
- **Gift exchange model** Akerlof (1982) and Akerlof and Yellen (1990)
 - Field experiments indicate effect of gift is short lived Gneezy and List (2006), Brocky, Langez, Leonard (2013)
- **Non monetary incentives interact with wages**
 - Higher paid civil servants face more social pressure to perform, World Bank, 2003
- **Selection into the service** Manning (2011),
 - Lower wages could also attract those with more intrinsic motivation Banuri, Keefer (2013)

Testing the theory

- Scarce evidence on outcome effects of raising public sector pay
 - Civil servant pay policies generally implemented across the board limiting the number of studies with credible counterfactual
- Existing evidence
 - Unconditional pay
 - Dal Bó, Finan, Rossi (2013) show that higher wage offers in Mexico yield a greater acceptance of qualified and motivated candidates
 - Hanushek, Eric A, Kain, John F, & Rivkin, Steven G. 1999. Exploiting district salary differences find small effect on teachers moving, some effect on performance in certification, but no effect on student learning

Our paper

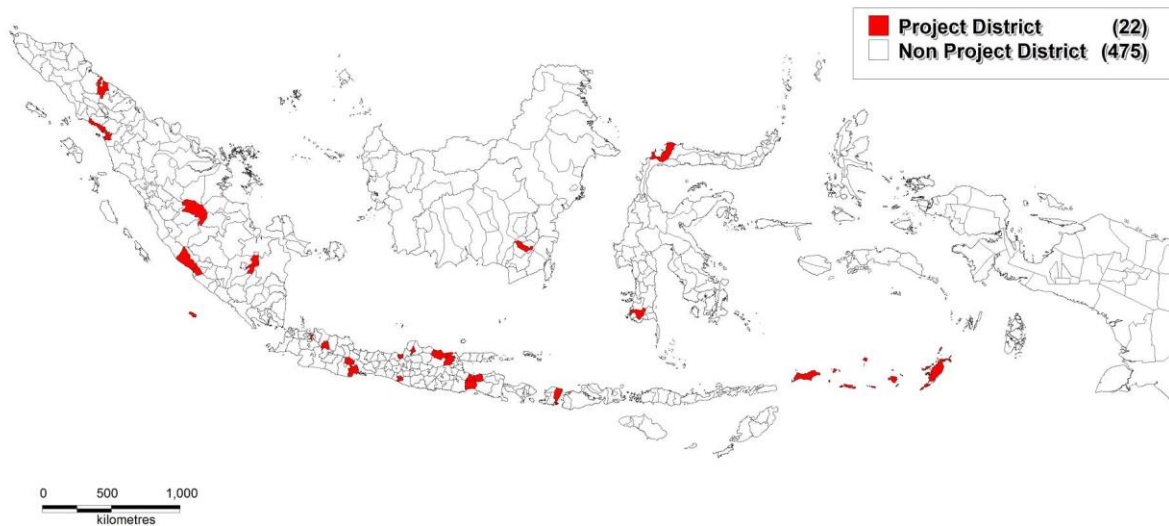
- Tests the effect of a doubling of teacher salaries in Indonesia
- 2005 teacher law introduced a doubling of salaries for certified teachers
 - Pay raise ranges of around 100 dollars per month making it one of the most expensive education policies ever, raising education expenditures by .. Bln once fully impended
 - Only teacher with bachelors degree eligible for certification
 - Program phased over period of 10 years giving senior teachers priority for entree into the process
 - Certification is almost guaranteed, based on portfolio with a 2 week training for those who do not pass the portfolio review. Earlier intentions to link certification and quality were abandoned.
- First paper to test national program of increases in civil servant pay using RCT

Experimental Design

- Sample
 - 20 districts across Indonesia sampled from 383 of the 454 districts
 - 360 primary and junior secondary schools, excluding schools with few eligible teachers
 - All classroom teachers in primary, subject teachers in maths, science and Indonesian language
 - Data: 3 waves of student tests, teacher tests and interviews
- Data representative for approximately 40% of the public schools and teachers in the country
- In one third of sampled schools eligible teacher working in treatment schools received a personal letter that they could immediately enter the certification process
 - Rest of program implemented as is, no other interference besides survey
 - Districts compensated for additional slots

Sample

- 240 primary schools, 120 junior secondary public schools



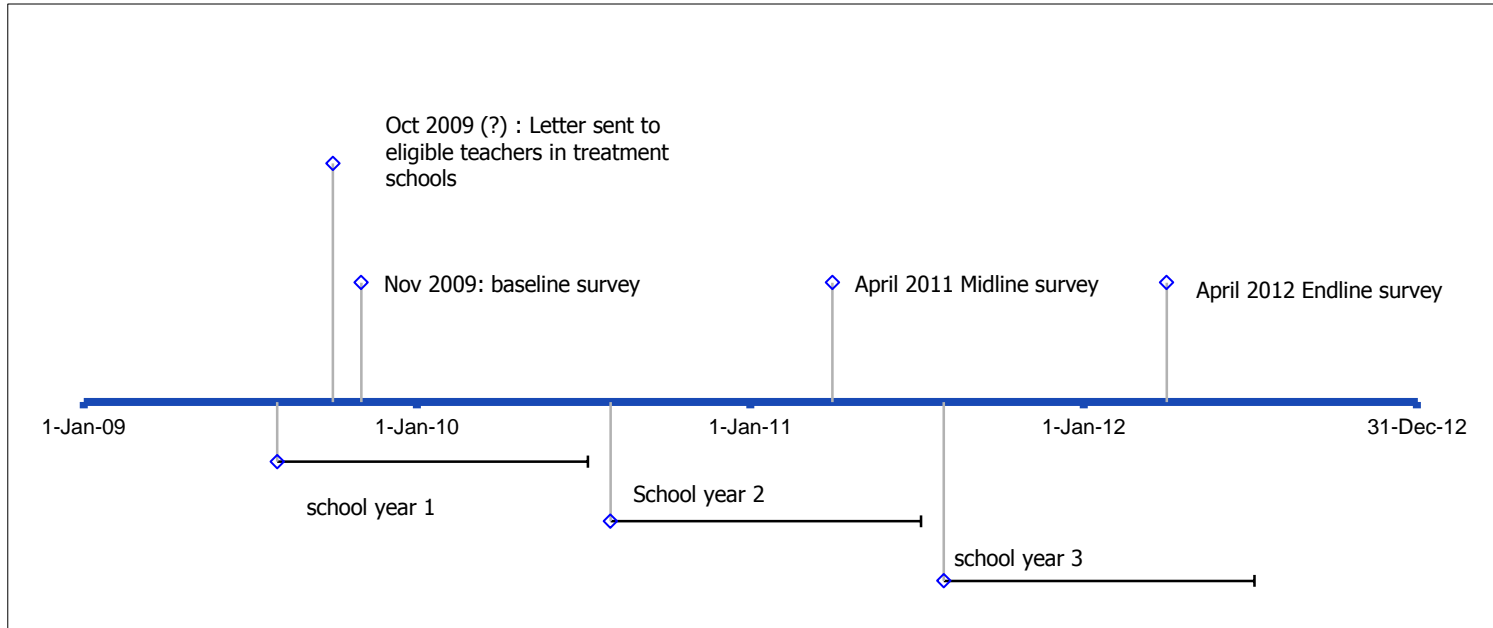
Main findings

- Reduction of second jobs and improvement in teacher satisfaction
- Precise zero effect on student test scores
 - No varying treatment effect by teacher or student ability
- Non experimental evidence suggests positive effect through incentives for teacher upgrading

Why would we expect an effect?

- Eligible teachers
 - Gift exchange: In return for higher salaries teacher may feel obliged to put more effort into their jobs.
 - Low salaries often blamed for poor learning outcomes
 - Salary raise is permanent in comparison with other civil servants
 - Interaction of Non-monetary incentives with salary
 - Headmasters and community may apply greater social sanctions on teachers with higher wages.
 - Greater effects expected for better observable indicators of effort

Data and timeline



	Teacher test + Survey	Student test	
	N	Grades tested	N
Baseline	3358	2,3,4,5,6 ,8,9	62,221
Midline	1700	1,3,4,5,6,7,8,9	40,000
Endline	1700	1,2,4,5,6,7,8,9	40,000

Balance

- Balance checked on
 - 4 school level variables
 - 26 teacher level variables
 - 9 student level variables
- Means never significantly different at 5 percent level, except
 - for “enrolled in certification quota”, which is higher for the treatment group and can be explained by the fact that the baseline survey was done shortly after the intervention

Selected baseline descriptive statistics

	treatment	control	p value	N
School-level variables				
number of classes per school	6.85	6.30	0.12	342
number of students per school	195.00	188.71	0.69	342
class size	27.15	27.97	0.46	342
number of teachers per school	9.58	9.19	0.48	342
Teacher-level variables				
eligible but not certified at baseline (target)	0.60	0.61	0.89	3150
certified	0.19	0.18	0.64	3150
not eligible for certification	0.20	0.21	0.81	3150
bachelor's degree	0.63	0.60	0.46	3145
civil servant	0.82	0.84	0.40	3151
years of teaching experience	18.22	18.88	0.32	3151
eligible/qualified for certification	0.80	0.79	0.81	3150
enrolled in the certification quota	0.61	0.29	0.00	3151
member of teacher working group (KKG/MGMP)	0.79	0.80	0.71	3151
holds a second job	0.33	0.34	0.86	3151
Absent at least once in previous week	0.26	0.23	0.32	3151

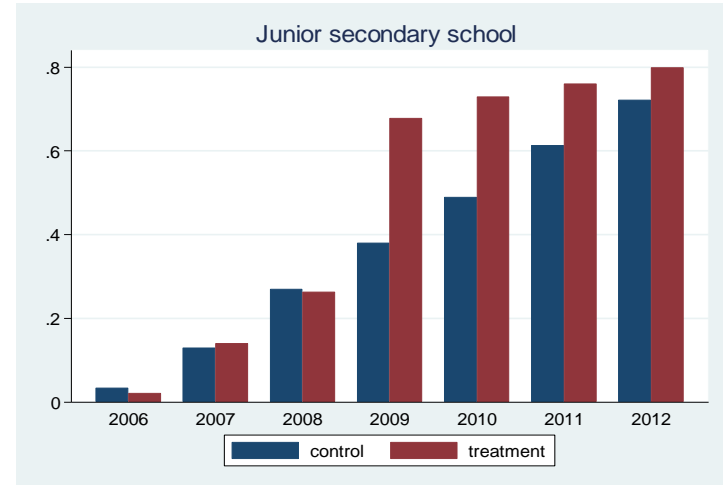
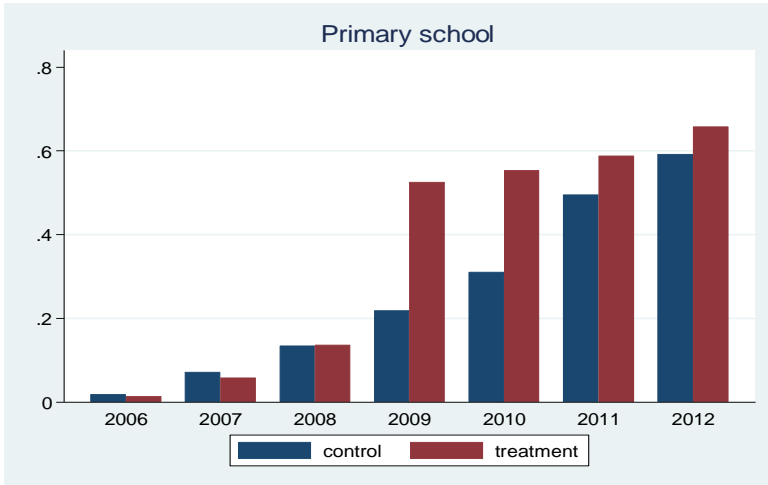
Attrition

- No differential teacher attrition between control and treatment group

Attrition rates

	treatment	Control	difference	p value
fraction not observed at midline, after being observed at baseline	0.16	0.20	-0.04	0.10
fraction not observed at midline AND not at endline, while observed at baseline	0.14	0.16	-0.02	0.26
fraction not observed at endline, after being observed at baseline	0.21	0.23	-0.02	0.29
fraction not observed at endline, after being observed at midline	0.09	0.10	-0.02	0.23

Take up rate



- Entry into certification process
 - same across treatment and control before intervention
 - Large difference in 2009 and 2010
 - Control schools catch up as result of national roll out

ITT effects on teachers Certification/Allowance

		Overall effect		Target teachers		Non-target teachers	
		Estimate	P value	Estimate	P value	Estimate	P value
certified	M	0.22***	0.00	0.40***	0.00	0.00	0.81
	E	0.13***	0.00	0.22***	0.00	0.02	0.42
professional allowance (in mill. Rp.)	M	0.55***	0	0.98***	0	0.05	0.44
	E	0.46***	0	0.85***	0	0.05	0.56

$$y_{i\tau} = \phi_0 + \phi_1 I_i + \gamma y_{i0} + e_{i\tau} \quad \forall \tau = 2, 3$$

$$y_{i\tau} = \phi_0^t t_{i\tau} + \phi_0^{nt} nt_{i\tau} + \phi_1^t t_{i\tau} I_i + \phi_1^{nt} nt_{i\tau} I_i + \gamma y_{i0} + e_{i\tau} \quad \forall \tau = 2, 3$$

- Target always defined on the basis of baseline data

ITT effects on teachers Skills

		Overall effect		Target teachers		Non-target teachers	
		Estimate	P value	Estimate	P value	Estimate	P value
standardized subject matter test score	M	0.02	0.73	0.03	0.65	0.03	0.73
	E	-0.02	0.7	-0.02	0.79	-0.01	0.91

ITT effects on teachers

Work

		Overall effect		Target teachers		Non-target teachers	
		Estimate	P value	Estimate	P value	Estimate	P value
holds second job	M	-0.06***	0	-0.06**	0.01	-0.07 **	0.01
	E	-0.05**	0.02	-0.05*	0.07	-0.05	0.1
second job - working hours per week	M	-0.56**	0.03	-0.47	0.14	-0.81**	0.03
	E	-0.49*	0.07	-0.45	0.17	-0.43	0.27
teaching hours	M	0.2	0.44	0.48	0.1	-0.12	0.76
	E	0.16	0.59	-0.01	0.97	0.3	0.49
teaching hours (other school)	M	0.01	0.94	0	0.99	-0.02	0.94
	E	0.19	0.29	0.2	0.48	0.1	0.6
absent at least once in previous week	M	0	0.95	-0.02	0.32	0.01	0.54
member of teacher working group (KKG/MGMP)	M	-0.01	0.35	0.00	0.82	-0.01	0.41
	E	0.01	0.7	0.00	0.87	0.02	0.33

ITT effects on teachers

Finances

		Overall effect		Target teachers		Non-target teachers	
		Estimate	P value	Estimate	P value	Estimate	P value
total pay excluding professional allowance (in mill. Rp.)	M	-0.07**	0.01	-0.03	0.2	-0.08	0.12
	E	-0.01	0.63	0.02	0.41	-0.04	0.47
financial problems	M	-0.09***	0	-0.12***	0	-0.06*	0.06
	E	-0.08***	0	-0.13***	0	-0.01	0.82
satisfied with total income	M	0.09***	0	0.16***	0	0.01	0.64
	E	0.07**	0.01	0.14***	0	-0.01	0.72

Effects on teachers

- Estimates using balanced panel and IV estimates of certification effect show similar patterns

Effect on student learning

- Three models
 - Intent to treat

$$y_{i\tau} = \phi_0 + \phi_1 I_i + \gamma y_{i0} + e_{i\tau} \quad \forall \tau = 2, 3$$

- Instrumental variables

$$y_{i\tau} = \beta_0 + \beta_1 cc_{i\tau} + \gamma y_{i0} + e_{i\tau}$$

- Assumes program only has an effect through certification (no spill overs)
- Certification of which teacher?
- Student had different teachers between baseline, midline and endline
 - $cc_{i\tau}$ = Number of periods the student has a certified teacher between baseline and survey.
 - Period is taken at time of survey, so for $\tau=3$ period can be 0,1,2,3
 - For junior secondary this is done separately for each subject tested.

Effect on student learning

– More efficient instrumental variables

- Interact intervention dummy with periods the student had an eligible teacher
- For example, for midline instruments are

$$t_{is1} t_{is2} l_i, nt_{is1} t_{is2} l_i, t_{is1} nt_{is2} l_i, nt_{is1} nt_{is2} l_i$$

Where t_{is1} indicates whether student i had a target teacher in period 1

– Endogenous assignment of students to teachers

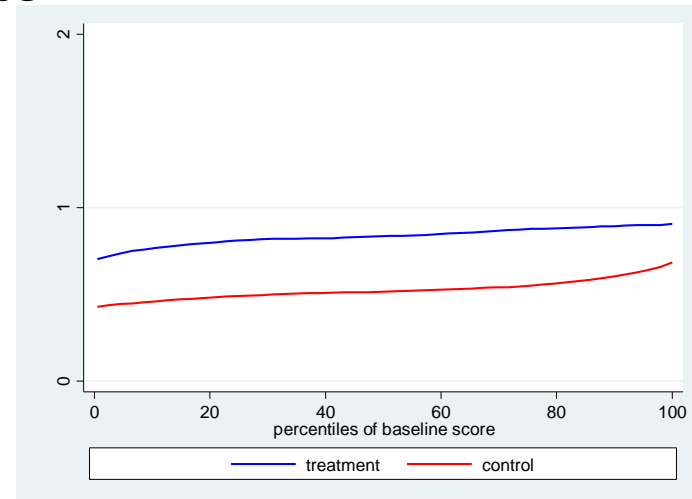
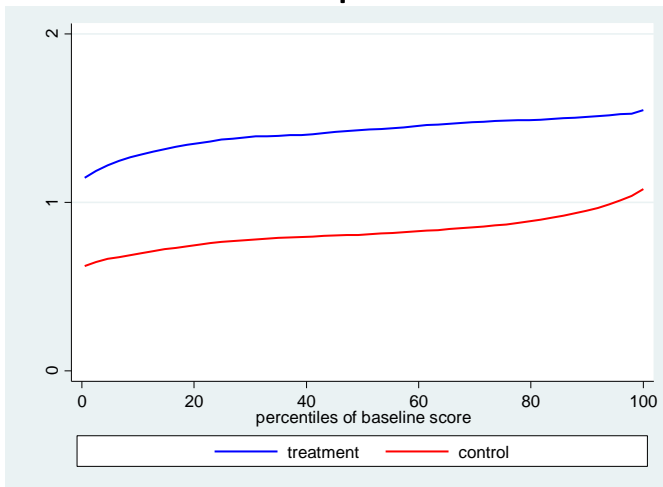
- Non of the means of target interaction variables are significantly different between control and treatment group

Effects on student learning

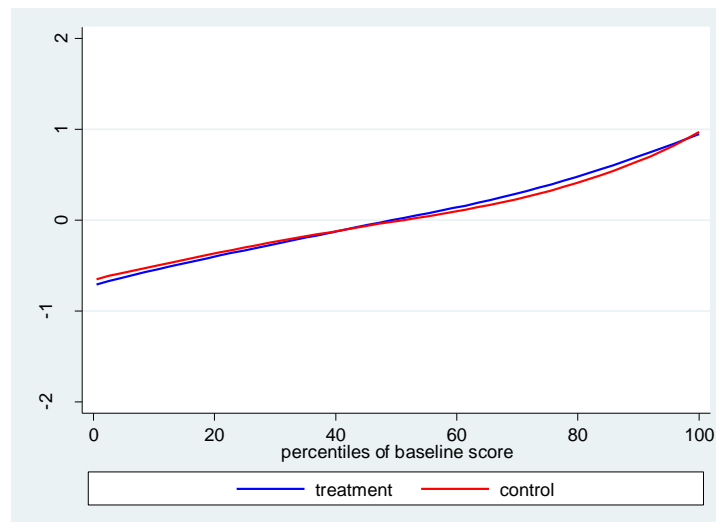
	causal effect	standard error	p value
Comparing treatment and control			
ITT	0.01	0.04	0.88
The number of periods certified (IV)			
LATE certified	0.03	0.1	0.74
LATE certified (efficient IV)	0.01	0.06	0.84
LATE certified (eff. IV + FE)	0.00	0.07	0.98
The number of periods since first paid the professional allowance (IV)			
LATE paid	0.04	0.11	0.72
LATE paid (efficient IV)	0.02	0.07	0.75
LATE paid (eff. IV + FE)	-0.05	0.05	0.3

by test score at baseline-Midline

- Across the board increase in exposure to certified and certified teachers who received professional allowance

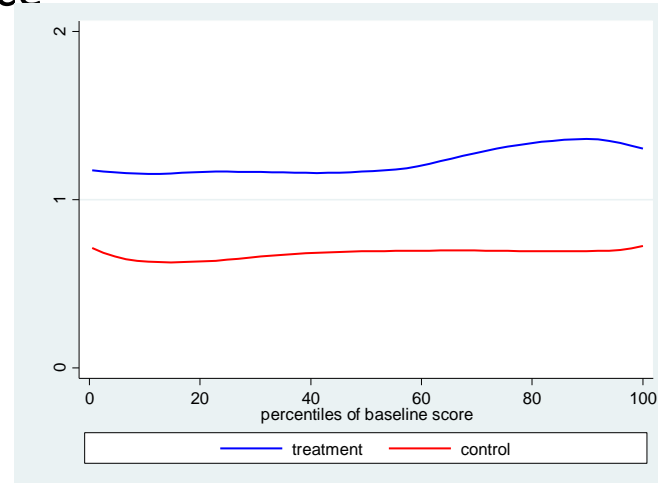
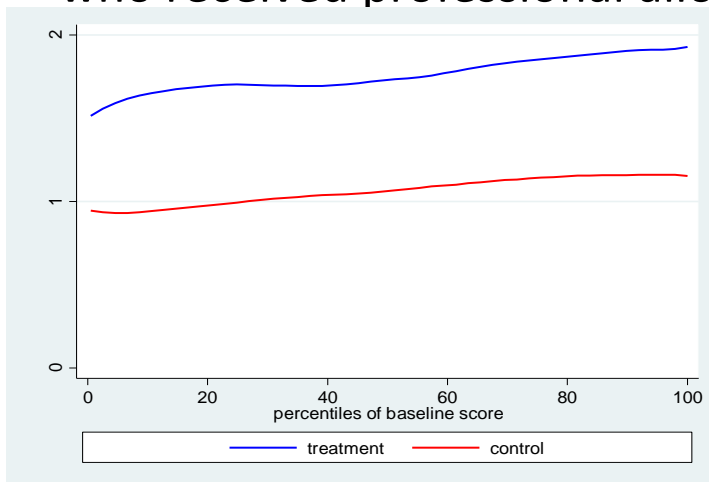


- Across the board no effect on student learning

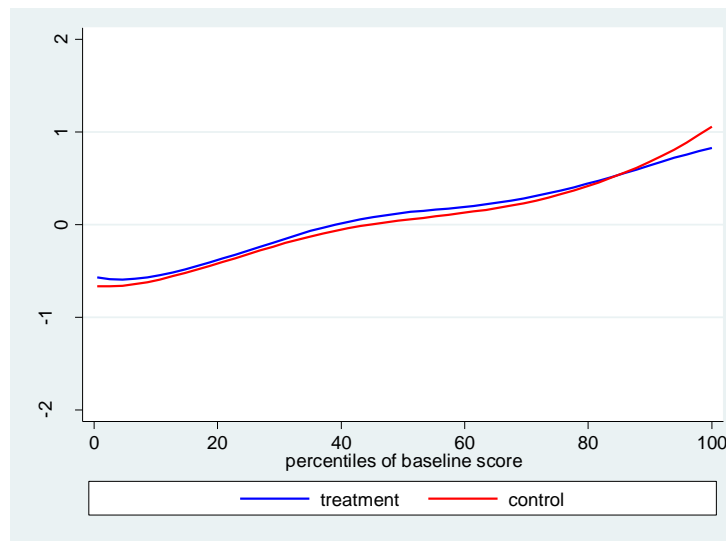


by test score at baseline-Endline

- Across the board increase in exposure to certified and certified teachers who received professional allowance

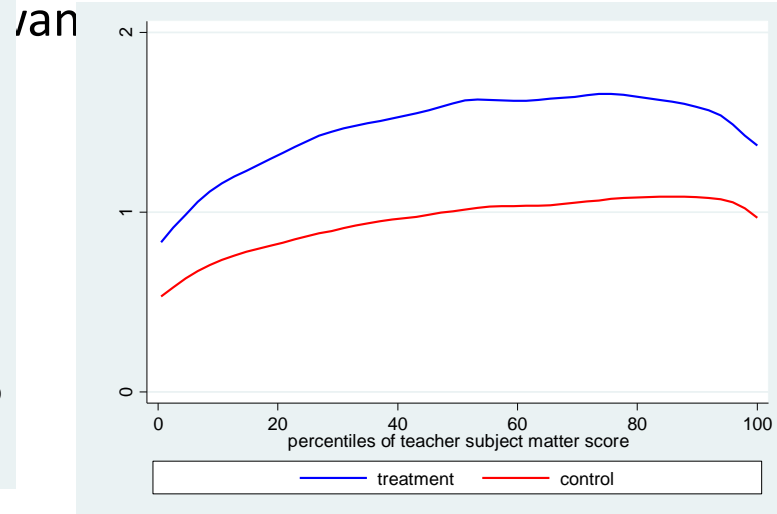
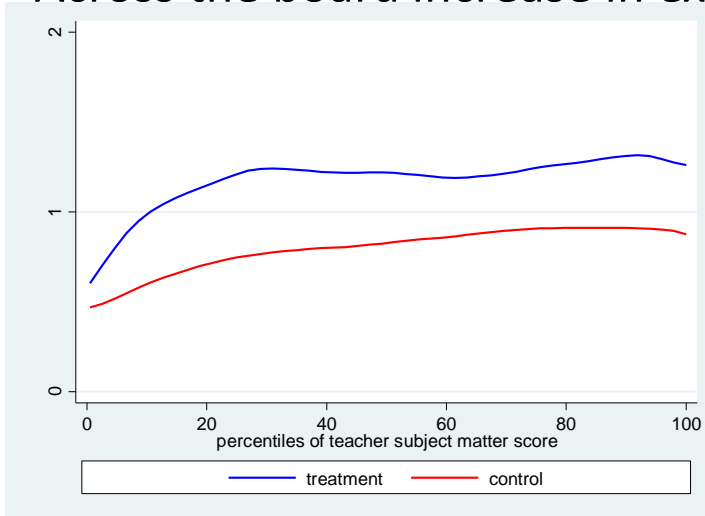


- Across the board no effect on student learning

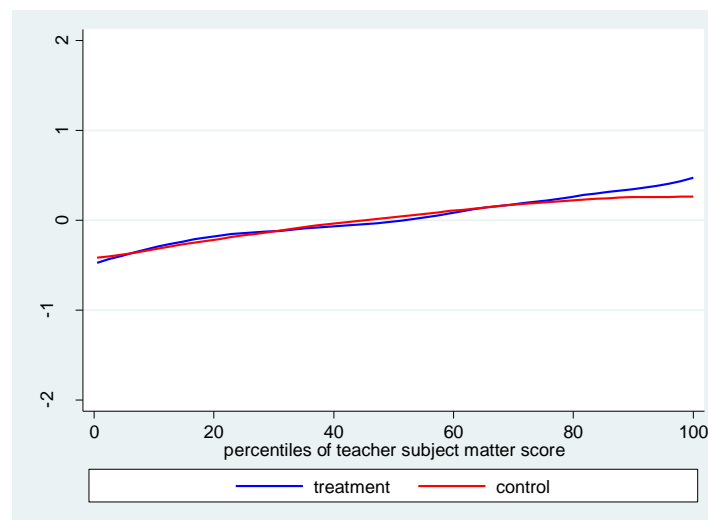


by teacher test score at baseline-Endline

- Across the board increase in exposure to certified and certified teachers



- Across the board no effect on student learning



Conclusions

- Evaluation of effects of national Government program of doubling of teacher salaries on existing eligible teachers
 - Large scale experimental design with minimal interference
 - Large effect on probability of certification and increased teacher income.
- Limited impact
 - Reduction in second jobs, but no effects on student learning.
- Other possible effects left uninvestigated
 - incentive for teacher to upgrade to bachelors level
 - Selection effect into the teacher profession