# DOUBLE FOR NOTHING?

## EXPERIMENTAL EVIDENCE ON AN UNCONDITIONAL TEACHER SALARY INCREASE IN INDONESIA

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# Background/Motivation

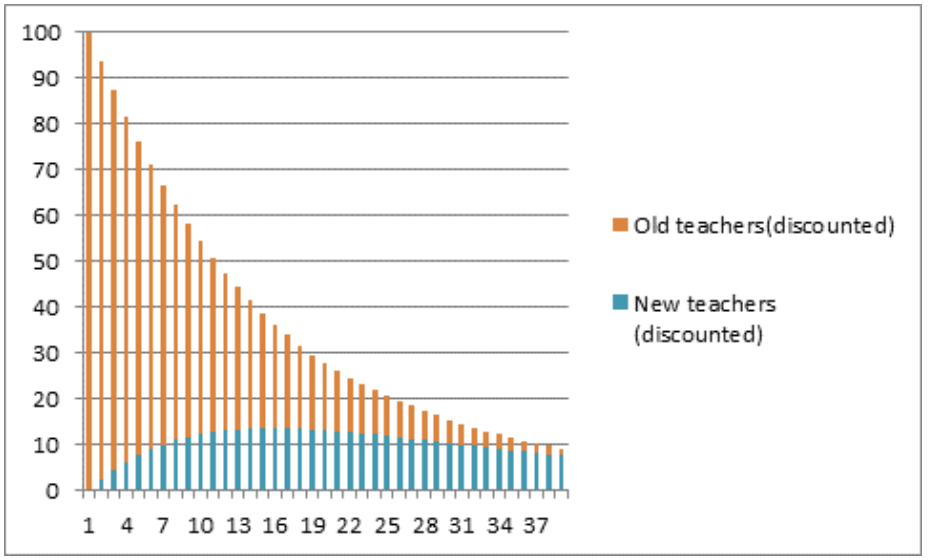
- Teacher pay is important policy variable with high cost implications. How could rising teacher pay increase performance?
- "Extensive-margin" argument : A higher wage attracts a larger pool of applicants. Evidence:
  - Hiring stations in Mexico that offer higher wages attract more highly qualified job applicants (Dal Bo 2013).
  - Higher pay for politicians in Brazil results in higher qualified politicians with better performance (Ferraz and Finan 2011)"
- "Intensive-margin" argument: Existing workers put in more effort if paid more. Evidence:
  - Police performance reduces if arbitrators awarded lower pay than asked (Mas 2006)
- Very little rigorous evidence for teacher salaries

# Background/Motivation

- "intensive-margin" argument
  - Not obvious, certainly not for civil servant teachers who face little risk of getting fired.
  - Widely believed in the education policy community that low teacher pay is a leading reason for poor teacher performance in developing countries (EFA Global Monitoring Report 2014)
- Multiple narratives:
  - Many teacher take on multiple jobs to make ends meet. Rising teacher pay would reduce necessity for second jobs and allow teachers to focus on their main job.
  - Higher wages would increase morale. They will be more motivated to give back to society.
  - Hard to hold underpaid teachers to account. If pay were higher, communities and head masters could enforce higher performance expectations.

# Cost/Benefit Motivation

- Extensive-margin" effects need to be three times larger than the "intensive-margin" effects, for them to yield equivalent (monetary) returns in present value terms.
- Assuming:
  - (1/40) share of teachers get replaced by new teachers every year
  - Interest rate of 7 percent (1/(1+r))=discount rate)



# Policy Context

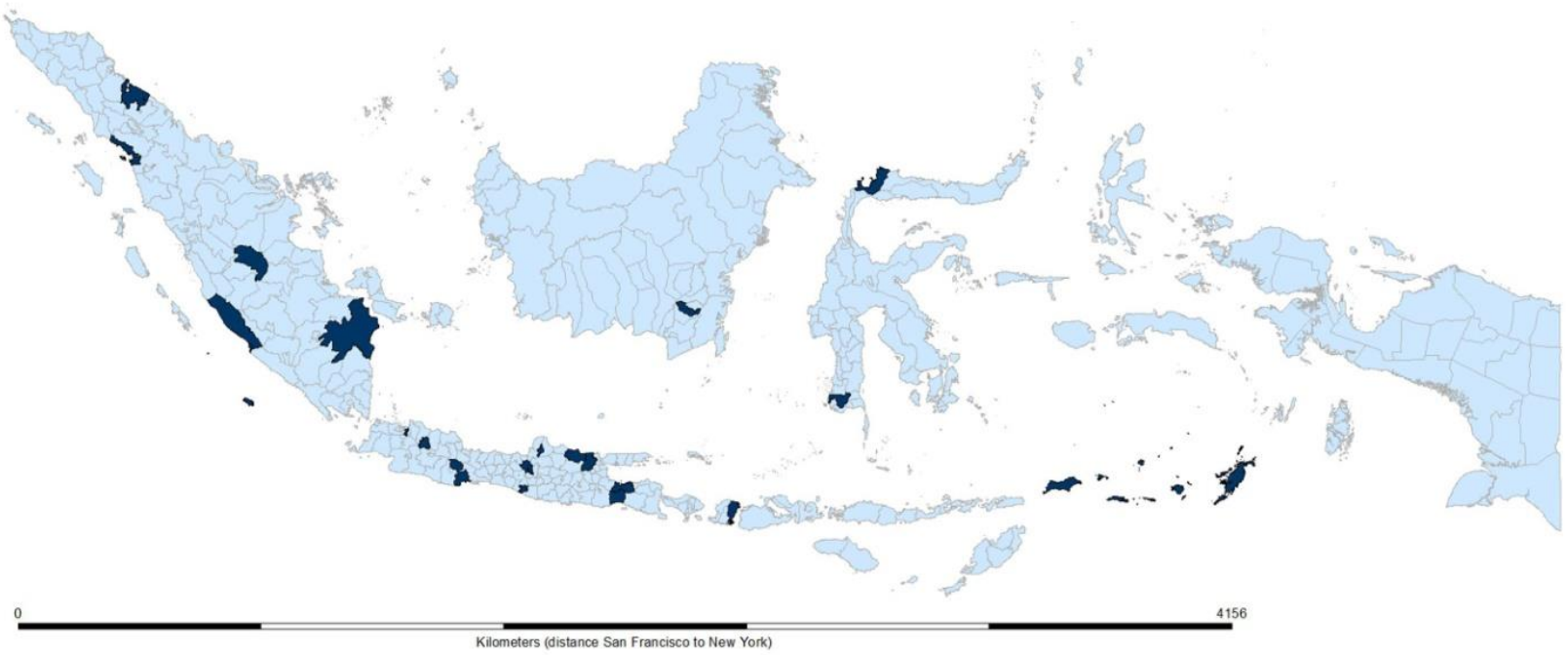
- Teacher certification program in Indonesia awarded certified teachers with a permanent *doubling* of teacher pay
  - Eligibility: Civil servant teachers and bachelors degree
  - Increase moved them from 50$^{th}$ to 90$^{th}$ percentile of college graduate salary distribution
- Indonesian Teacher Law of 2005 stipulated also
  - Teachers were supposed to upgrade skills and get rewarded for doing so
  - Quality improvement stipulations were mostly abandoned over time and replaced with an anodyne "portfolio submission" (so pretty much a straight pay increase)
  - Policy phased in over 10 years for fiscal reasons – with senior teachers getting the first priority to enter the certification process

# This study

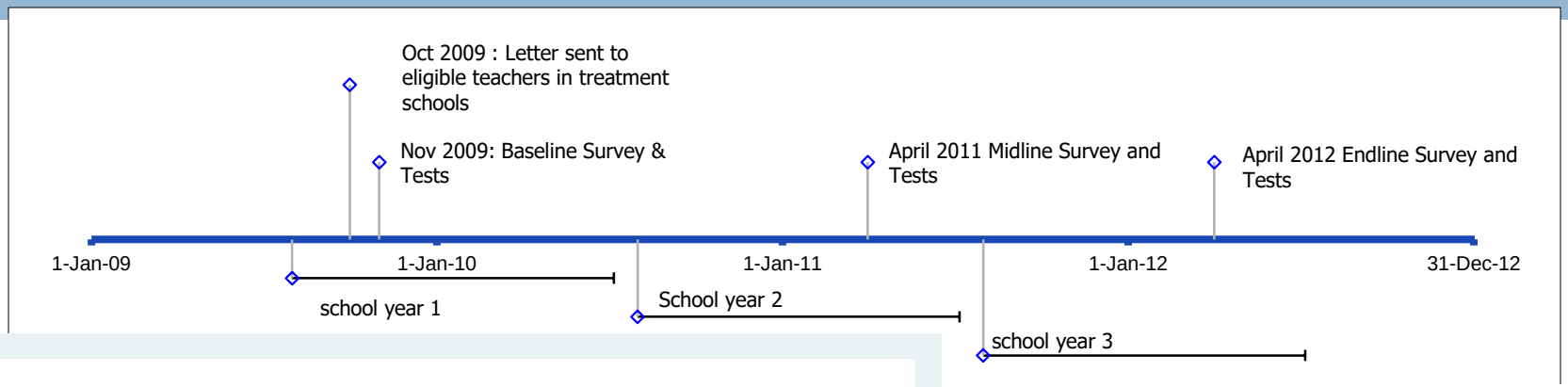
- We worked with the Government of Indonesia to experimentally evaluate the **"intensive-margin" effects** of the certification program
- The government agreed to allow **all** eligible teachers in randomly selected schools to be immediately eligible for certification
  - Sampled 240 primary and 120 jun. secondary schools across 20 districts in Indonesia
  - In one third of this sample, eligible, “non-certified” teachers were informed that they could immediately enter into the certification program
  - Districts were compensated for the extra slots required
  - For the rest the no interference in regular process

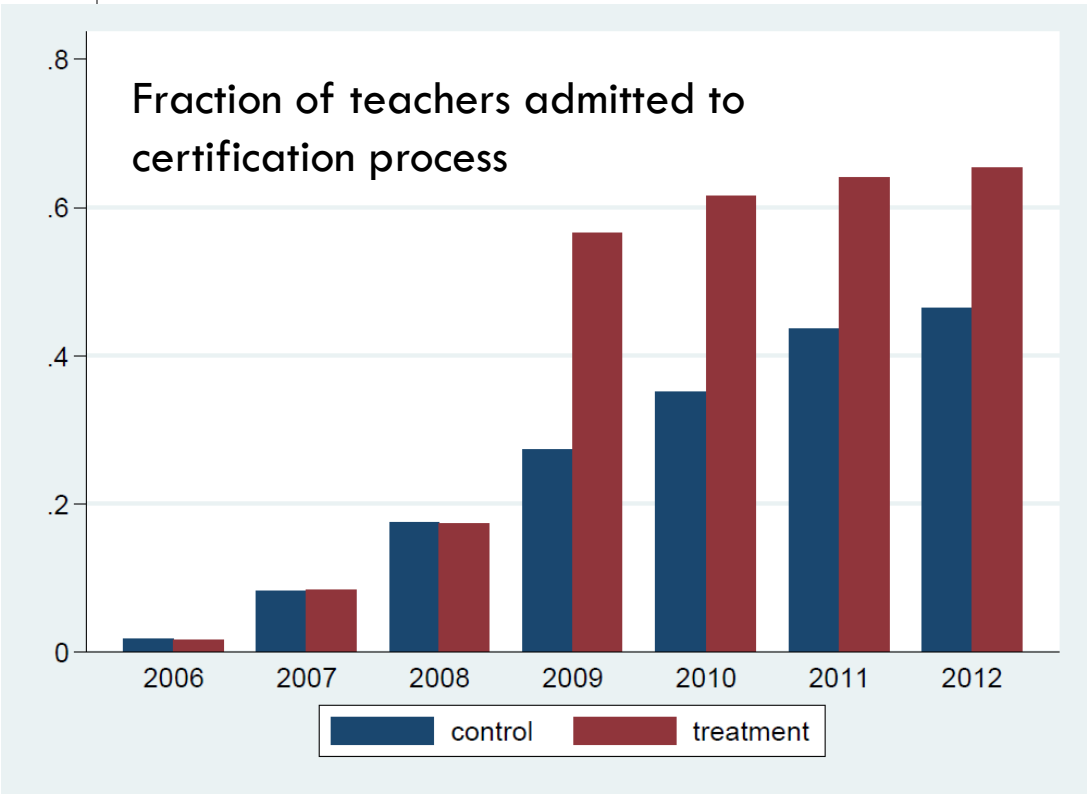
# Sampled Districts (Indonesia map)

**Figure 1: map of the 20 selected districts in Indonesia**



# Data and timeline

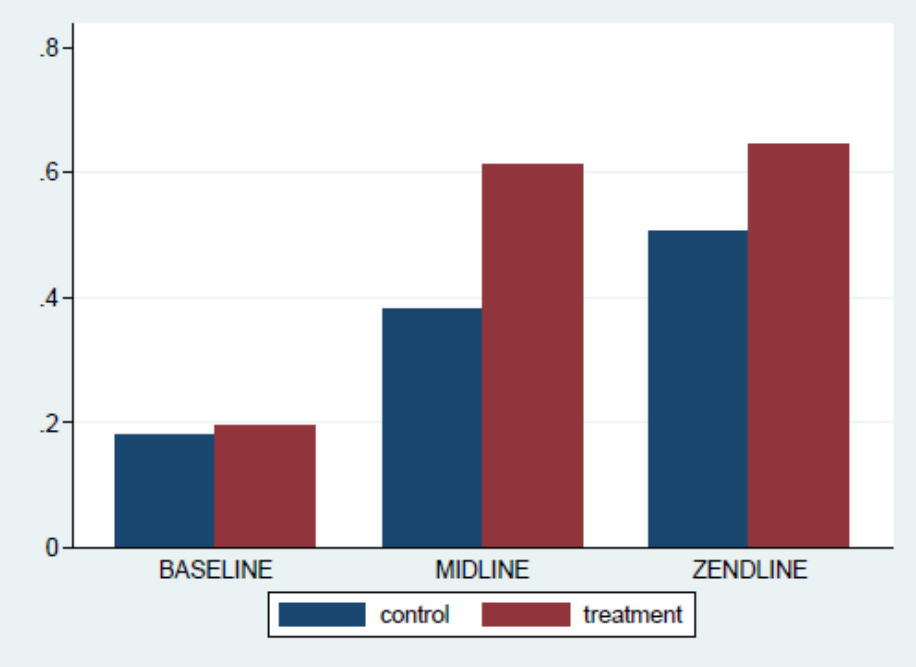


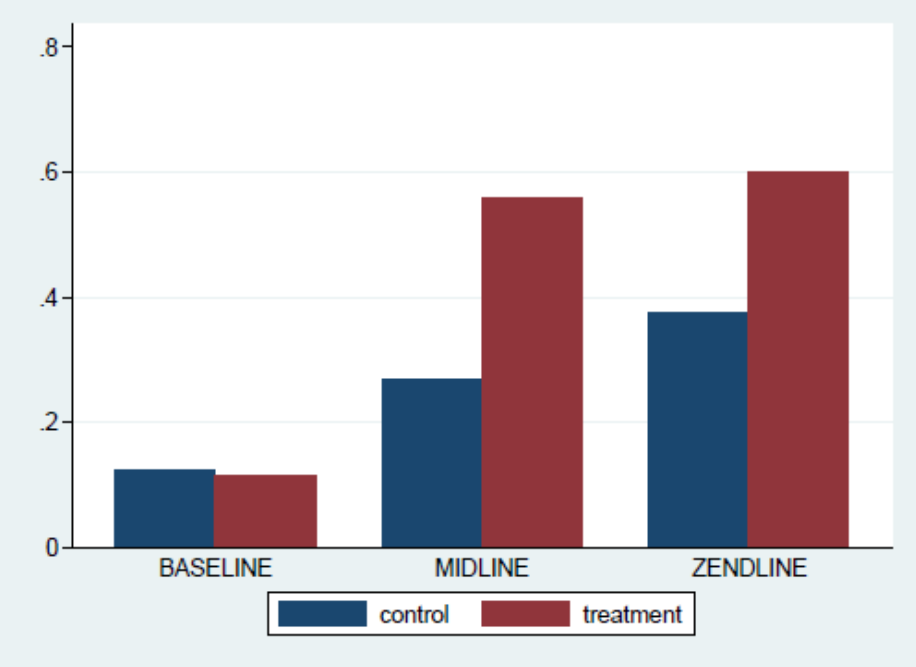

- Experiment
  - started when program was two years underway
  - Resulted in large increase in certification in treatment schools

# Data and Timeline

- As expected, entrance into certification was followed by certification and increase in pay




Certification




Allowance payments

# Outcomes and Model

- Student tests, in nearly all grades
  - Intend to treat estimates (comparing treatment and control schools)
  - IV estimates of being taught by certificated and paid teacher (Based on sample of target teachers)

- Model
  - $T_{ijks}(Y_n) = \beta_0 + \beta_1 \cdot \overline{T_{jks}}(Y_0) + \beta_j \cdot T_{ijks}(Y_0) + \beta_2 \cdot Treatment_k + \beta_{Z_{ST}} \cdot Z_{ST} + \varepsilon_{ijks}$

- Teacher self reported effort and satisfaction.
  - Intend to treat, comparison of means

# Baseline Balance: School

| | Treatment | Control | Difference |
|---|---|---|---|
| number of classes per school | 8.89 | 8.32 | 0.57 |
| _ | (4.88) | (4.49) | (0.35) |
| number of students per school | 190.85 | 184.49 | 6.36 |
| _ | (133.80) | (135.32) | (10.41) |
| class size | 20.60 | 20.99 | -0.39 |
| _ | (6.76) | (7.16) | (0.64) |
| number of teachers per school | 9.35 | 9.07 | 0.27 |
| _ | (5.20) | (4.59) | (0.36) |
| | | | |

# Baseline Balance: Students

| | Treatment | Control | Difference |
|---|---|---|---|
| Raw math score (fraction correct) | 0.41 | 0.40 | 0.00 |
| _ | (0.23) | (0.23) | (0.01) |
| Raw science score | 0.51 | 0.52 | -0.00 |
| _ | (0.21) | (0.21) | (0.01) |
| Raw Indonesian score | 0.58 | 0.59 | -0.01 |
| _ | (0.21) | (0.20) | (0.01) |
| Raw English score | 0.40 | 0.39 | 0.01 |
| _ | (0.18) | (0.17) | (0.01) |
| Student assets index | 0.55 | 0.53 | 0.00 |
| _ | (0.24) | (0.24) | (0.01) |

# Baseline Balance: Teachers

| | Treatment | All Control | Diff |
|---|---|---|---|
| Fraction "target" at Y0 | 0.56 | 0.57 | -0.01 |
| | (0.50) | (0.50) | (0.02) |
| Fraction already certified at Y0 | 0.19 | 0.18 | 0.02 |
| | (0.39) | (0.38) | (0.01) |
| Fraction not eligible for certification at Y0 | 0.25 | 0.25 | -0.00 |
| | (0.43) | (0.43) | (0.01) |
| Fraction with bachelor's degree | 0.62 | 0.59 | 0.04*** |
| | (0.49) | (0.49) | (0.02) |
| Fraction who started or completed the certification process | 0.61 | 0.29 | 0.33*** |
| | (0.49) | (0.45) | (0.02) |
| Second job | 0.34 | 0.34 | -0.00 |
| | (0.47) | (0.47) | (0.02) |

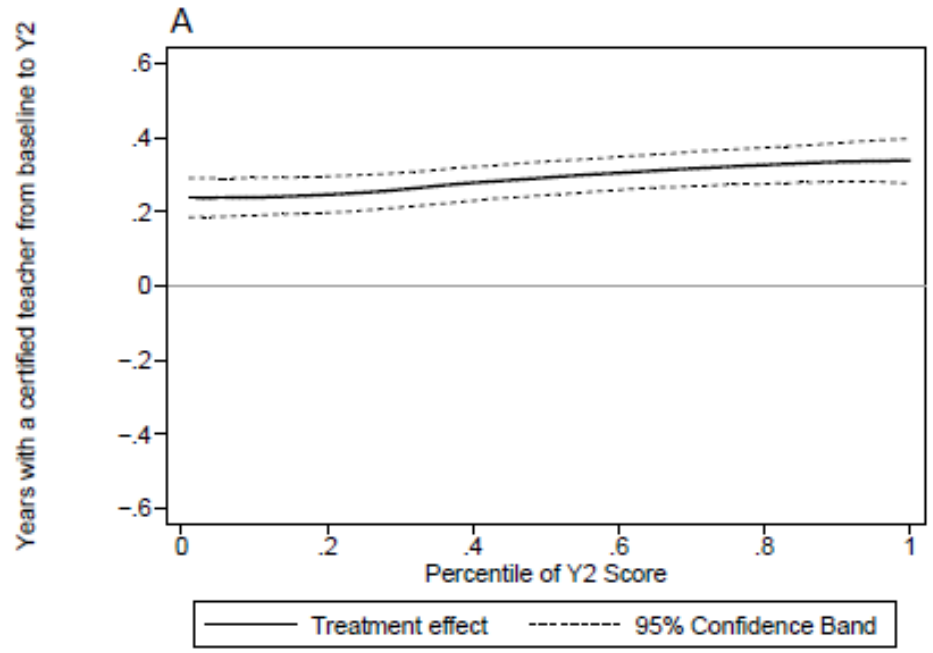
# Impact: All Teachers – Y2 and Y3

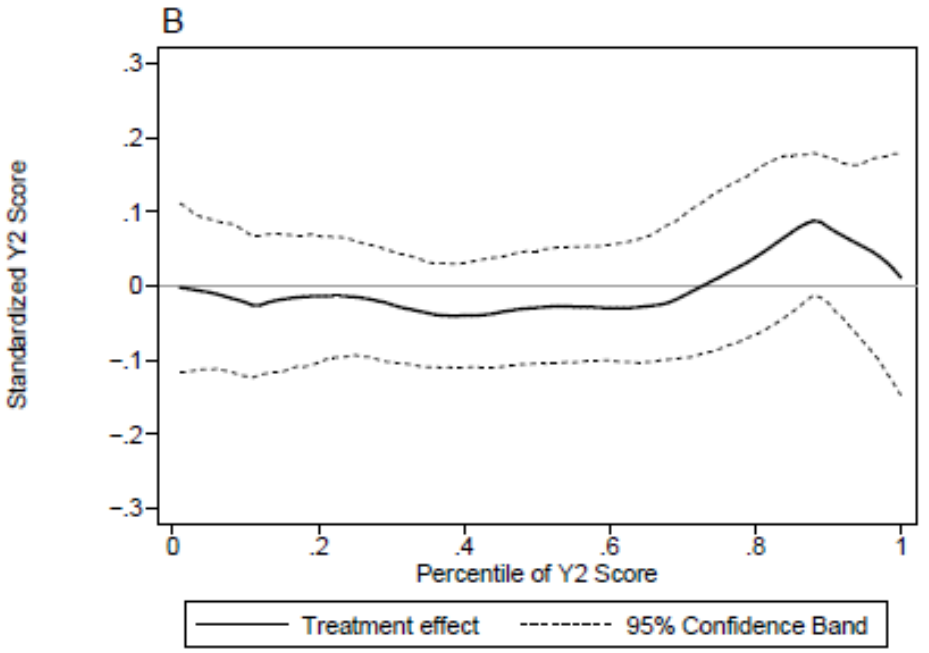
| | | Y2 | | | Y3 | |
|---|---|---|---|---|---|---|
| | Control mean | Impact (simple diff) | Impact (diff in diff) | Control mean | Impact (simple diff) | Impact (diff in diff) |
| Standardized test scores | 0.01 | 0.00 | 0.04 | 0.01 | -0.06 | -0.04 |
| | [0.99] | (0.05) | (0.05) | [0.99] | (0.05) | (0.05) |
| Fraction pursuing further education | 0.18 | -0.01 | | 0.16 | -0.03 | |
| | [0.39] | (0.01) | | [0.37] | (0.01) | |
| Fraction with a second job (self reported) | 0.32 | -0.06*** | -0.06*** | 0.27 | -0.05** | -0.04** |
| | [0.47] | (0.02) | (0.02) | [0.44] | (0.02) | (0.02) |
| Total pay | 3.41 | 0.44*** | 0.66*** | 4.29 | 0.43*** | 0.64*** |
| | [1.97] | (0.08) | (0.05) | [1.95] | (0.09) | (0.07) |
| Financial problems (self reported) | 0.50 | -0.09*** | | 0.56 | -0.09*** | |
| | [0.50] | (0.02) | | [0.50] | (0.02) | |
| Satisfied with total income (self reported) | 0.60 | -0.09*** | | 0.60 | 0.07*** | |
| | [0.49] | (0.02) | | [0.49] | (0.02) | |
| Absent from school at least once in the past week (self reported) | 0.14 | -0.00 | -0.02 | 0.13 | 0.01 | -0.00 |
| | [0.34] | (0.01) | (0.01) | [0.33] | (0.01) | (0.01) |

# Students: ITT impacts on test score

| | ALL school types | |
|---|---|---|
| | **Year 2** | **Year 3** |
| Test scores (std dev) | -0.005 | 0.010 |
| | (0.024) | (0.026) |
| *Nr of observations* | 279,066 | 274,993 |

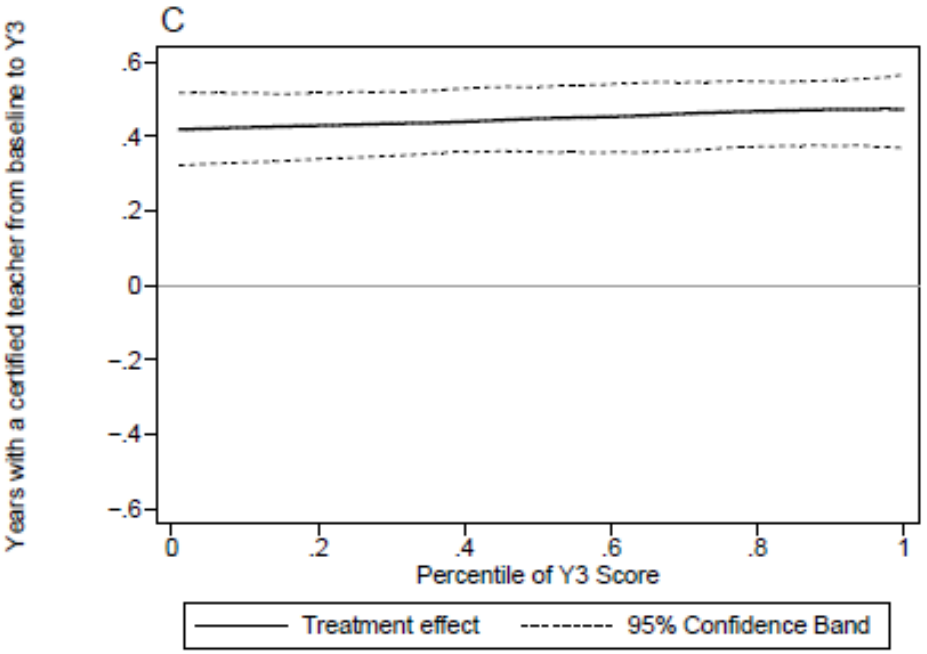
# IV estimates (Y2 data)

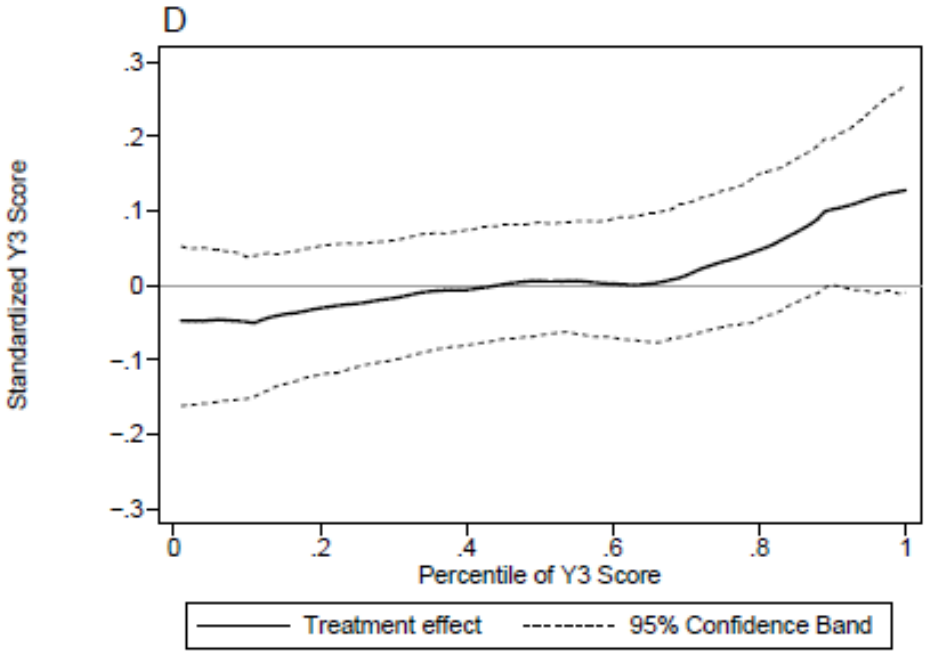



- Similar increase in exposure to a certified and paid teacher
- No impact on test scores at any point of the baseline test score distribution

# IV estimates(Y3 data)




- Similar increase in exposure to a certified & paid teacher
- Cumulative difference in exposure between T & C increases towards Y3
- No impact on test scores at any point of the baseline test score distribution

# Robustness tests

- No differential attrition between control and treatment schools (based on test scores at baseline)
- No differential student entry into control and treatment schools (based on asset index)
- No differential rates of assignment to target teachers in control and treatment schools.

# Summary of Results

- The experiment "worked" remarkably smoothly and was implemented by the government as intended
- Large first-stage effects on the fraction of teachers who get the pay increase in the treatment schools due to the treatment
- Teachers in treatment schools report an increase in satisfaction with pay, reductions in financial stress, and reductions in the incidence of holding second jobs (and in the hours worked on them)
- Absolutely zero impact on test scores of students in treated schools
  - Precise zeros – can rule out effects larger than 0.05 SD in ITT estimates
  - IV estimates are also zero: Restrict analysis to students taught by teachers who were "eligible but not certified" at the start, we use the experiment instrument for duration taught by a "certified and paid" teacher
  - Can rule out IV estimates over 0.1 SD at the teacher level

# Interpretation and Discussion

- Results suggests that the intended mechanisms of the policy “worked” but that this was largely a transfer to teachers (no welfare cost - except DWL of raising tax revenue)

- Rejects posited "intensive-margin" mechanisms (gift exchange, teaching as a normal good, accountability)
- Relevant for literature on public sector labor markets more broadly

- Policy implications
  - Increased wage bill by ~33% with no immediate impact on learning
  - Cannot rule out positive "extensive-margin" effects on teacher quality in the long run
  - Calls for new conditions for continued certification pay