The Impact of Teacher Effectiveness on Student Learning in Africa

Julie Buhl-Wiggers[1], Jason Kerwin, Jeffrey Smith and Rebecca Thornton

[1]Institute of Food and Resource Economics
University of Copenhagen

June 16, 2017

Teacher Quality

- Teacher quality is a key determinant of learning
- Two approaches:
  1. Teacher Effectiveness: Estimate TVA and find that variation in TVA explain a substantial part of the variation in test scores. (Chetty et al., 2014; Araujo et al. 2016; Azam & Kingdon, 2015; Bau & Das, 2017 amongst others)
  2. Program Evaluation: Interventions involving teachers are some of the most effective. (Glewwe & Muralidharan, 2016; Kremer et al., 2013; Ganimian & Murnane, 2014; McEwan, 2014; Evans & Popova 2016)
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    - Providing the first estimates of TVA in Africa
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Preview of Results

- A 1 SD increase in teacher effectiveness increases student learning by 0.14 - 0.19 standard deviations.
- Teacher effectiveness correlates with teacher behaviours such as observing performance, encouraging participation and lesson planning, but not characteristics.
- Teacher training and support increases the spread of the TVA distribution by making the good teachers better.

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- Four year longitudinal RCT (2013-2016). Random sample of children tested using EGRA and followed across years.
  - 2013 (38 schools): Grade 1.
  - 2014 (128 schools): Grade 1, Grade 2.
  - 2015 (128 schools): Grade 1, Grade 2, Grade 3.
  - 2016 (128 schools): Grade 1, Grade 2, Grade 3, Grade 4.
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Sample

Table: Samples Across Years and Grades

	Full Sample	Longitudinal Sample	Random Sample
Panel A: All Schools			
# Schools	128	125	128
# Teachers	714	275	501
# Children	30,094	18,342	14,920
Pupils/Teacher	28	32	29
Panel B: Schools with more than one teacher			
# Schools	127	98	127
# Teachers	688	248	496
# Children	27,111	12,939	14,379
Pupils/Teacher	27	30	28

Classroom Effects

$$Y_{icgt} = \beta_0 + \beta_1 Y_{icgt-1} + \beta_2 X_{icgt} + \gamma_{cgt} + \zeta_g + \tau_t + \beta_3 Y_{ict-1} * \zeta_g + u_{icgt}$$

Y_{icgt}: is end-of-year test scores
Y_{icgt-1}: is beginning-of-year test scores
ζ_g: is a grade fixed effect
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Three Main Estimation Challenges

- **Separating classroom effects from school effects.**
  We re-scale classroom effects to be relative to the school mean
- **Getting a precise estimate of classroom effect.**
  We follow the approach suggested by Araujo (2016) and analytically adjust the estimated variance for measurement error.
- **Sorting of students into classrooms.**
  We utilize the fact that we have random assignment of children to teachers in 2013 and 2016 to estimate effects and assess the degree of bias present.

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Teacher Effects

Classroom effects are estimated for each teacher in each year. With multiple years of data it is possible to purge the year-to-year fluctuations and obtain teacher effects.

$$\hat{\gamma}_{cgst} = \hat{\alpha} + \hat{\delta}_{cgs} + \varphi_{cgst} \tag{1}$$

$\hat{\gamma}_{cgst}$: is the demeaned classroom effects.
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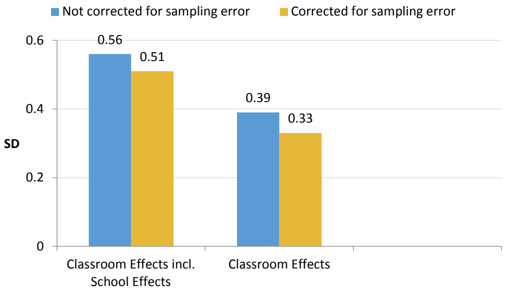
Results - Full Sample



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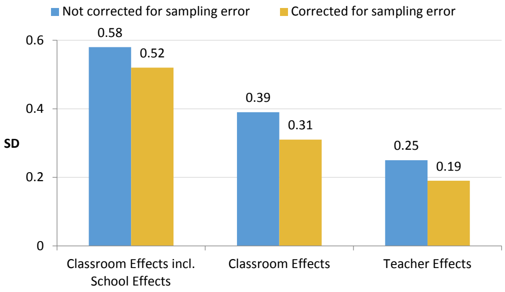
Results - Longitudinal Sample



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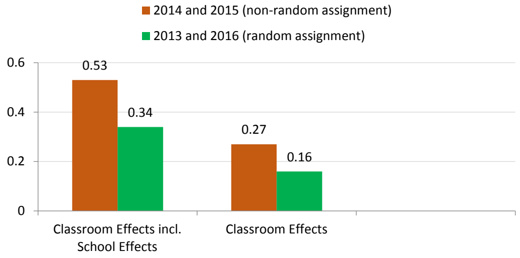
Results - Random Sample



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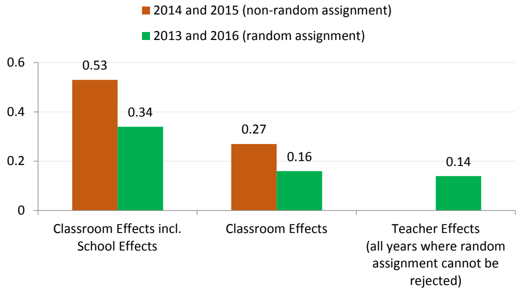

What Do These Numbers Mean?

- Our most conservative estimates suggests that a 1 SD increase in teacher quality would increase student learning by 0.14 - 0.19 SDs
- Taking a *bad* teacher (10^{th} percentile) to the level of a *good* teacher (90^{th} percentile) would increase student learning by 0.35 SDs

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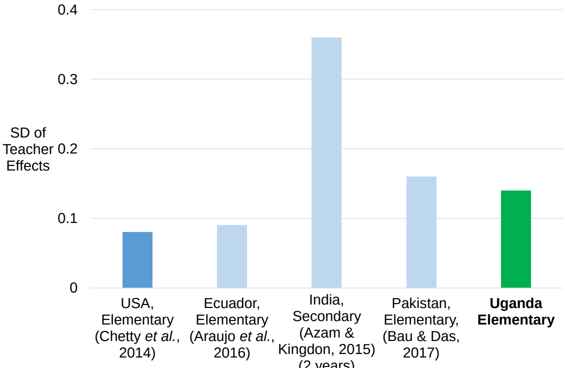
Estimates of Teacher Effectiveness in Different Contexts



Who are Good Teachers?

- Teacher characteristics
  - Surveys in 2013 and 2014

Who are Good Teachers?

VARIABLES	TVA
Age	0.001
	(0.002)
Years of schooling	0.002
	(0.011)
Ravens score	0.012
	(0.011)
Salary	0.198
	(0.166)
Gender	-0.010
	(0.030)
Observations	114
R-squared	0.029

What do Good Teachers do?

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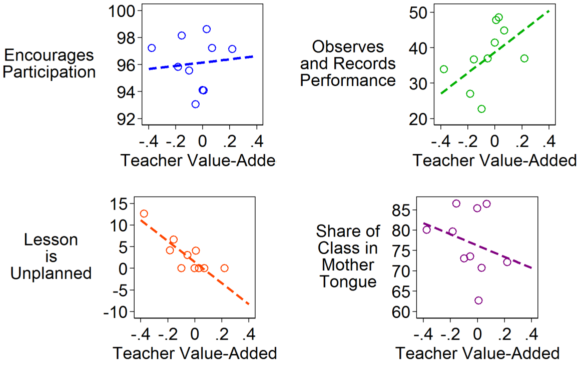
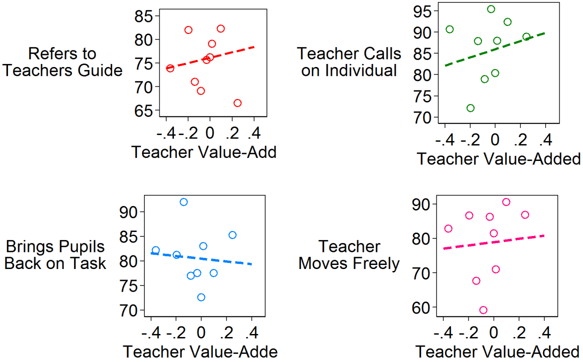
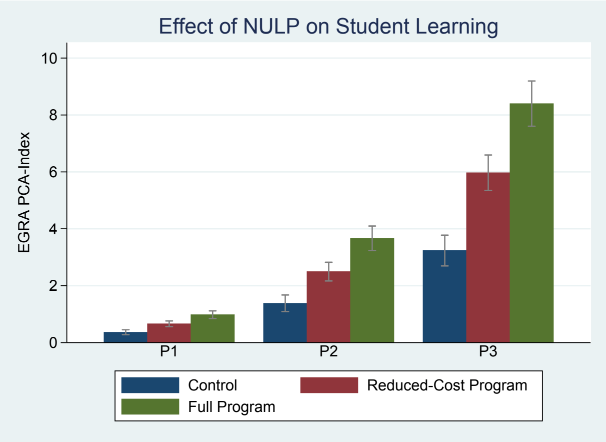


What do Good Teachers do? cont'd



Impact of the NULP on Student Learning



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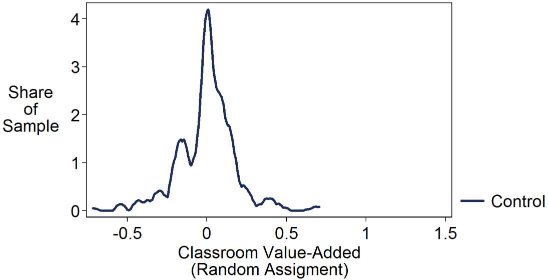

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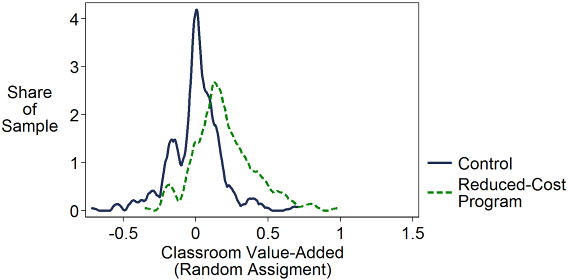

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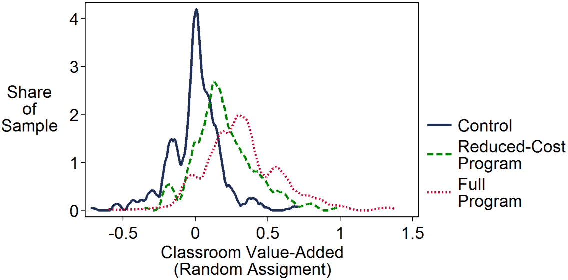

Take Aways

- We estimate teacher effectiveness in Africa.
  - Taking out school effects, estimation error and bias due to sorting still imply that a 1 SD increase in teacher effectiveness increase student learning by 0.14 to 0.19 SDs.
  - As previous literature we find that TVA correlates with teacher behaviour but not characteristics.
- Taking the literature further we shed light on what happens when we introduce a high impact teacher intervention.
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Future Directions

- Using video observations to figure out what the good teachers are doing?
- Who are the teachers that benefit the least/most from the program?