

# Is kindergarten too late?

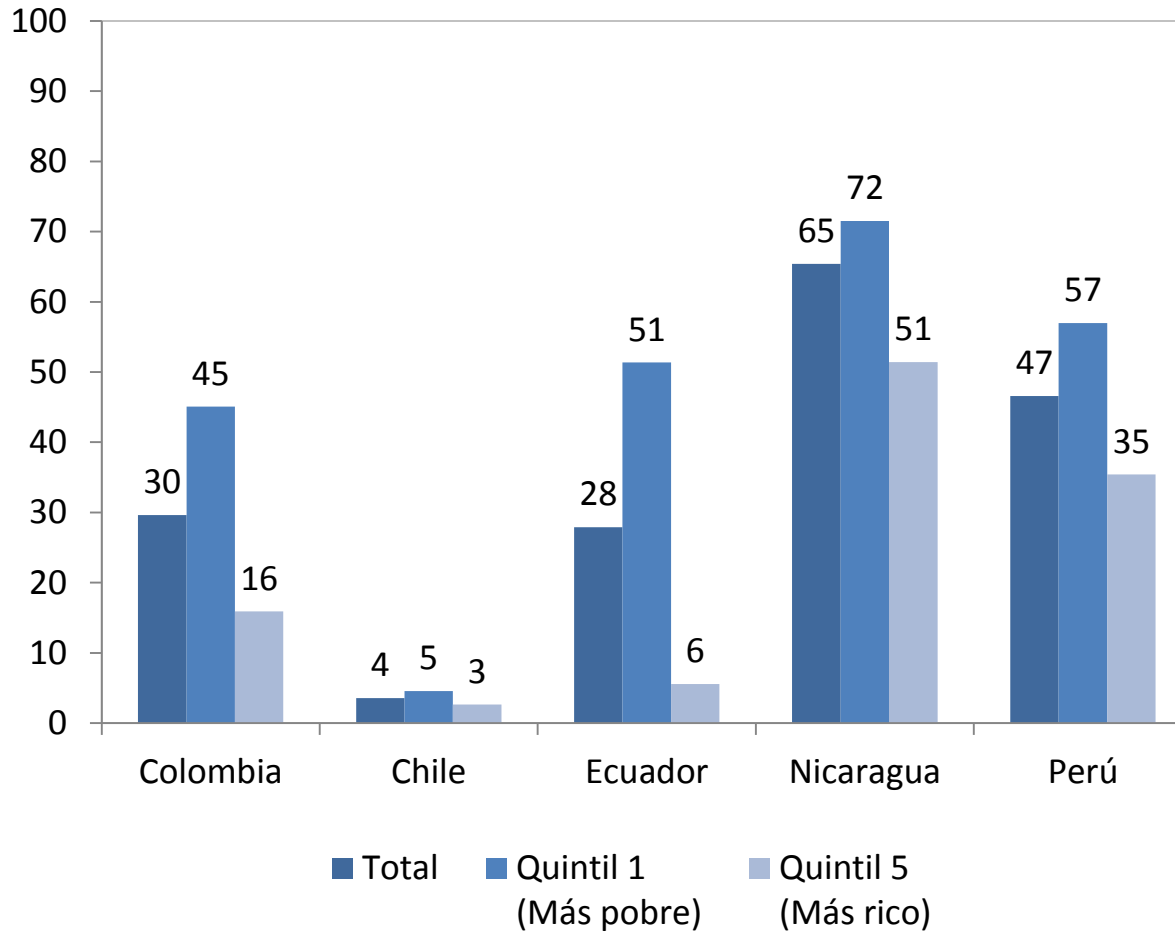
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# Motivation

- Many children in Latin America begin formal schooling with deep deficits, in particular in cognitive and language development

# ECD in Latin America: Basic facts



Source: Schady et al. (2014)

# Interventions to improve outcomes

- This has led to innovative social policy and careful evaluation of a variety of policies and programs that seek to reduce early deficits
  - Cash transfers Fernald et al. (2008; 2009) on *Oportunidades* in **Mexico**; Paxson and Schady (2010) and Fernald and Hidrobo (2011) on *Bono de Desarrollo Humano* program in **Ecuador**; Macours et al. (2012) on *Atención a Crisis* program in **Nicaragua**
  - Parenting interventions Gertler et al. (2013) and Walker et al. (2011) on intervention in **Jamaica**; Attanasio et al. (in progress) on *Madres Líderes* program in **Colombia**
  - Center-based care and preschool Bernal et al. (in progress) on AEIOTU program in **Colombia**; Barros et al. (in progress) on crèches in Rio de Janeiro, **Brazil**; Oosterbeck and Rosero (in progress) on at-scale program in **Ecuador**

# Kindergarten: A “captive audience”

## Kindergarten attendance rates, children aged 5 years

Country	Late 1990					Late 2000				
	Year	Mean	Q1	Q5	Gap Q5-Q1	Year	Mean	Q1	Q5	Gap Q5-Q1
Argentina	1999	75.3	65.0	91.9	26.9	2010	95.5	93.3	99.0	5.7
Brazil	1999	60.2	50.9	89.2	38.2	2009	84.4	79.8	95.7	15.9
Chile	1998	66.6	56.1	77.4	21.3	2009	90.3	87.2	95.9	8.7
Colombia	1999	67.3	51.9	86.4	34.5	2010	78.9	67.2	95.5	28.3
Costa Rica	1999	34.3	27.3	49.3	22.0	2010	71.8	66.2	88.0	21.8
Dom. Rep.	2000	66.4	52.7	82.9	30.2	2010	83.8	79.6	91.0	11.3
Ecuador	2000	70.2	62.7	78.7	16.1	2012	93.2	89.7	100.0	10.3
Honduras	1999	34.4	27.2	56.6	29.4	2010	69.8	66.3	88.4	22.1
Mexico	1998	76.6	59.4	95.1	35.7	2010	96.4	92.4	100.0	7.6
Nicaragua	1998	56.2	38.0	62.3	24.3	2010	72.6	66.0	94.4	28.4
Panama	1999	64.2	46.9	89.7	42.8	2010	80.7	68.4	93.8	25.4
Peru	1999	79.3	67.1	92.9	25.8	2010	91.6	82.7	99.5	16.8
Paraguay	1999	43.9	34.5	67.2	32.7	2010	68.5	48.3	79.4	31.2
El Salvador	1999	44.9	26.1	82.7	56.6	2010	66.5	56.6	90.8	34.2
Uruguay	1999	90.5	83.7	99.2	15.5	2010	97.3	96.5	98.2	1.7
Venezuela	1999	83.1	73.4	91.8	18.5	2010	91.4	89.2	96.7	7.6

Source: Own calculations, based on data from households surveys

# Is kindergarten “too late”? The Ecuador study

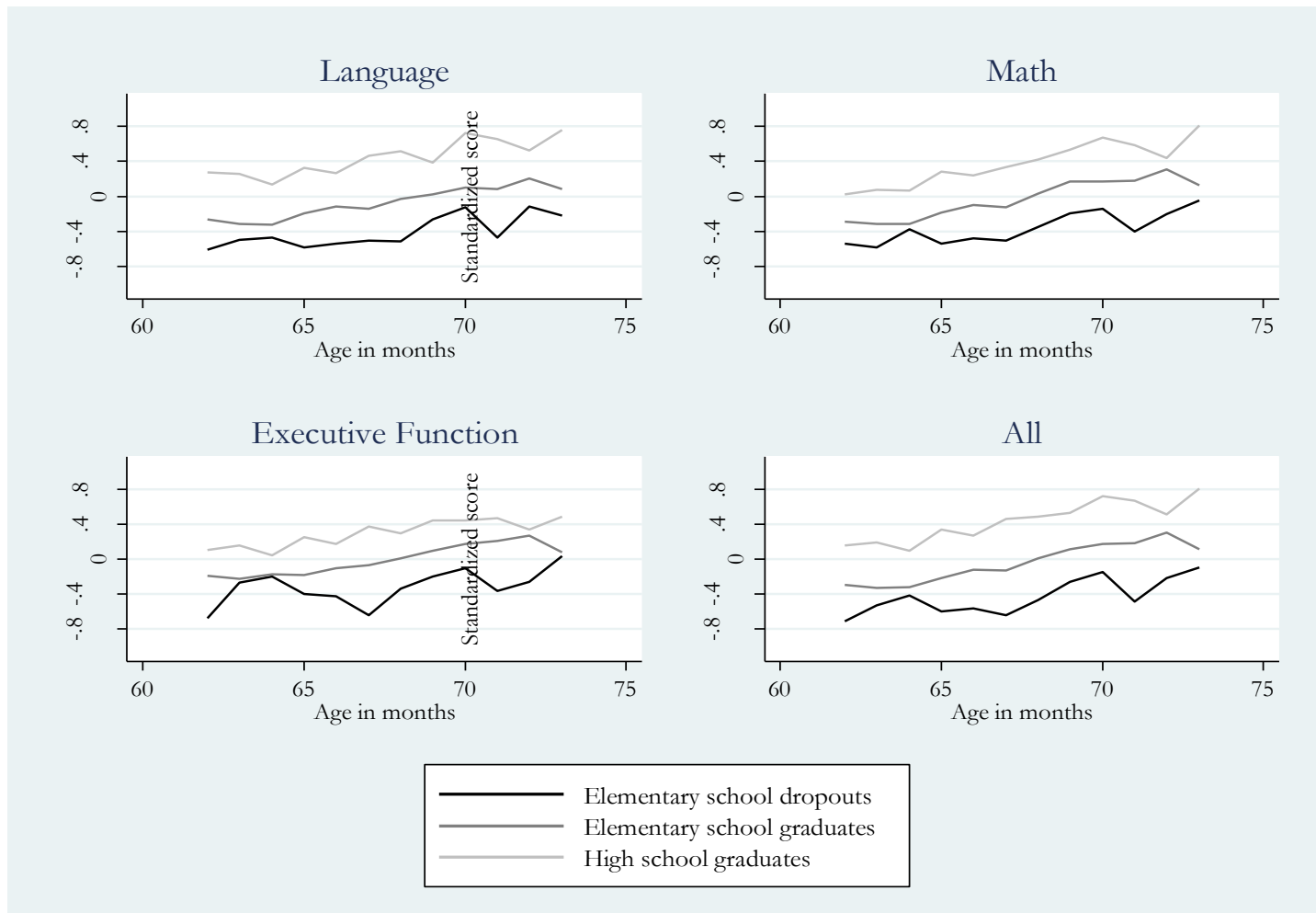
- Take random sample of 204 schools with 2 or more kindergarten classes in the coastal region of **Ecuador**
- Randomly assign an entering cohort of ~ 15,000 children to classrooms at start of 2012/2013 school year (May-January)
- Very high levels of compliance
  - 98.5 percent of children complying with experimental assignment
- Design similar to the much-studied STAR experiment in Tennessee (Krueger 1999; Chetty et al. 2011)

# Is kindergarten “too late”? The Ecuador study

## Collect very rich end-of-year data on children

- Math
  - Number ID
  - Numeric series
  - Applied problems
  - Block rotation
- Language
  - Letter & word ID
  - Identification of first sound of letter
  - Receptive vocabulary
  - Passage comprehension
- Executive function
  - Response inhibition (Day-Night Stroop)
  - Working memory (number strings, forwards & backwards)
  - Cognitive flexibility (dimensional card sort)
  - Attention
- 35-40 minutes per child
- 92.5 percent of children (including those who dropped out) completed all 12 tests

# Gradients in test scores by age and mother's education





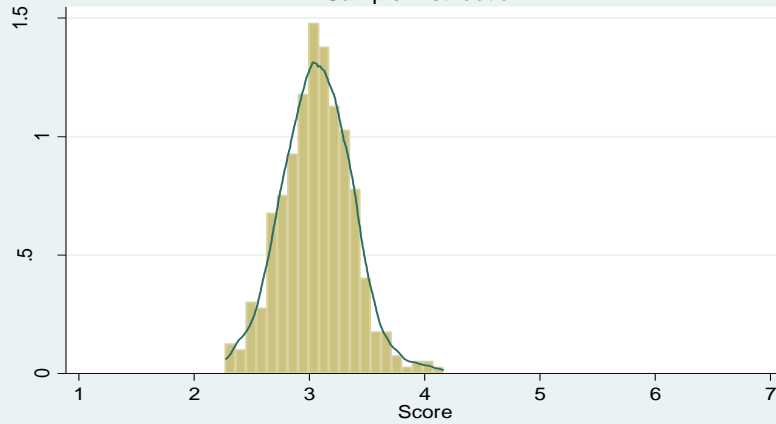
# Is kindergarten “too late”? The Ecuador study

## Collect very rich data on teachers, including CLASS (Pianta et al. 2007)

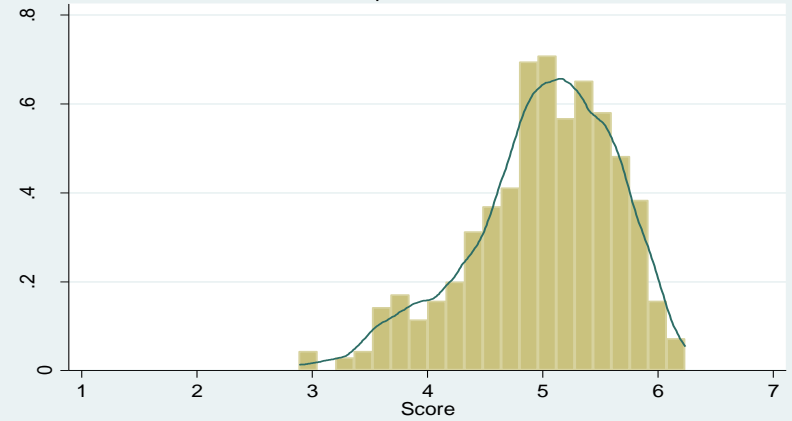
- Film teachers for one full day
- Double code all videos
- Three domains:
  - Emotional support (positive climate, negative climate, teacher sensitivity, regard for student perspectives)
  - Classroom organization (behavior management, productivity, instructional learning formats)
  - Instructional support (concept development, quality of feedback, language modeling)
- All coded on 1-7 scale
- A number of papers with US data have found that children exposed to teachers with better CLASS scores have higher learning gains, better child self-regulation, and fewer behavioral problems (Howes et al. 2008 and Mashburn et al. 2008; Grossman et al. 2010)
- Complementary body of research uses randomized trials of pilot programs: Shows that CLASS is malleable (Bierman et al. 2008; Brown et al. 2010; Domitrovich et al. 2008; Downer et al. 2011; Hamre et al. 2012; Pianta et al. 2008; Raver et al. 2008; and Yoshikawa et al. 2013)
- Also data on experience, tenure status, WAIS-IV intelligence, Big Five, executive function (not yet analyzed)

# CLASS scores

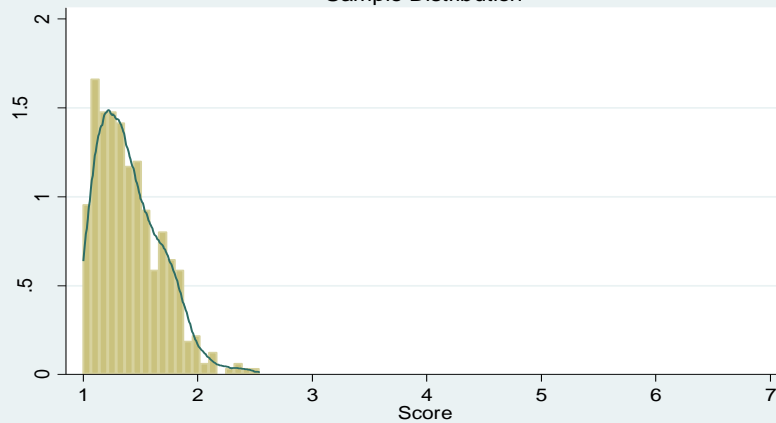
Emotional Support  
Sample Distribution



Classroom Organization  
Sample Distribution



Instructional Support  
Sample Distribution



# Estimation of teacher effects

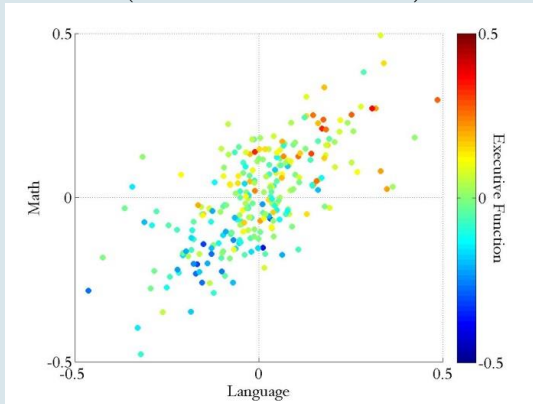
## Part I: Estimate teacher effects (ANOVA)

- Calculate average learning outcome per class, relative to school mean
- Calculate variance of teacher effects, and correct for sampling error
- Follows Kane and Staiger (2002), Jacob and Lefgren (2008), Chetty et al. (2011), among many others
  
- **Main result:** A one-standard deviation increase in within-school kindergarten teacher quality leads to:
  - 0.13 standard deviation higher test scores in language
  - 0.11 standard deviation higher test scores in math
  - 0.07 standard deviation higher test scores in executive function
- Because these ignore all cross-school variation in quality, they probably underestimate the true variation in teacher quality by ~a factor of two

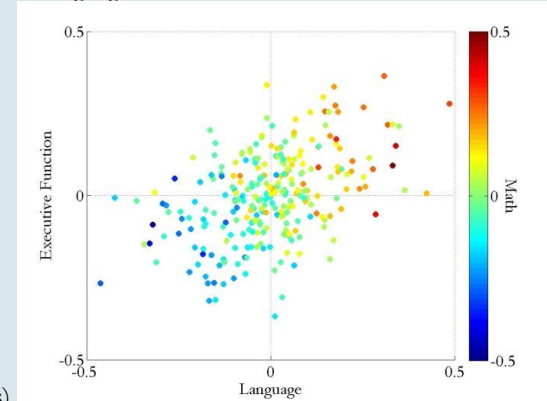
# Estimation of teacher effects

Pairwise correlations of teacher quality across test aggregates

Language and Math  
(Executive function in colors)

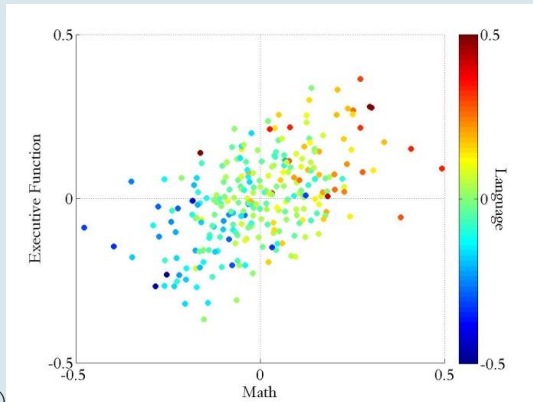


Language and Executive function



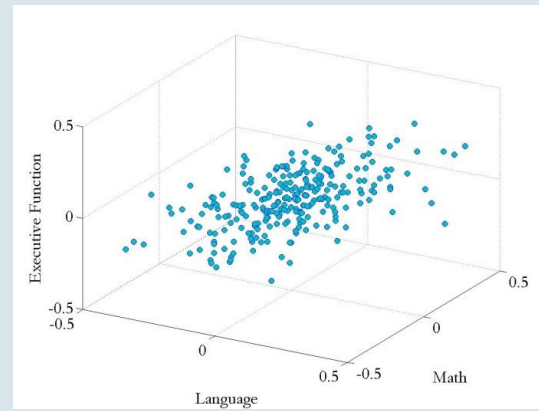
(Math in colors)

Math and Executive function



(Language in colors)

Language, Math, and Executive function



# Estimation of teacher effects

## Part II: Focus on teacher characteristics and behaviors

- Regress end-of-year test score of student  $i$  with teacher  $t$  in school  $s$  on baseline characteristics (TVIP, age, gender, parental education, wealth), school fixed effects, teacher characteristics (experience, tenure status), and teacher behaviors (the CLASS)
- Correct for measurement error in the CLASS (instrument CLASS in year  $t$  with CLASS in year  $t-1$ )

## **Main results**

- Children randomly assigned to teachers with <3 years of experience have 0.11-0.12 standard deviations less learning
- Children randomly assigned to teachers with a 1-point higher CLASS score have 0.6 standard deviation higher test scores, once the CLASS is corrected for measurement error
- The measurement error-corrected CLASS explains 34 percent of the variation in within-school, cross-teacher learning outcomes

# The “Closing Gaps” study in Ecuador

## Other results

1. Better teachers are better for all students: a rising tide lifts all boats
2. Better teachers do not affect the probability children will drop out of school or be absent (the *extensive* margin); rather, they affect the amount of learning per day of school (the *intensive* margin)
3. Parents recognize better teachers, but do not adjust their behaviors in response

# Conclusion

- We should worry a great deal about what happens before children enter school—there are large disparities in school readiness by SES and place of residence in Latin America
- However, better teachers in the early years can help close these deficits
- Can we design programs that are better at selecting teachers, provide more effective in-service training, or compensate teachers who are most effective?

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