The Impact of Learning in Mother Tongue First: Evidence from a Natural Experiment in Ethiopia

Yared Seid
International Growth Center

RISE Conference

June 16, 2017

MOTIVATION

- This paper offers empirical evidence on whether students taught in their mother tongue first learn in English better later
- Why do we care about this?
  - There's a move to mother-tongue instruction in many LDCs
  - Students transition to English-instruction after completing few years of schooling
  - However, the effect of moving to English instruction on the performance of students from different language groups is not well understood
  - The differential effect may set students from different language groups to different trajectories

KEY FINDINGS

- We exploit the 1994 education reform in Ethiopia and estimate triple-differences models
- Finding: learning in mother-tongue first increases mathematics test score by 0.114 standard deviations
- The effects are relatively stronger for kids in rural areas
- Falsification tests suggest that our results are not confounded by other factors

REST OF THE TALK

SCHOOLING & LANGUAGE IN ETHIOPIA

- The 1994 education reform has introduced mother-tongue instruction in primary schools
- Thus, language majority students learn in their mother tongue
- States in Ethiopia also choose when students transition to English instruction
- As a results, students transition to English instruction either in grade 5, 7 or 9
- We estimate triple-differences exploiting the variation in
  - the timing of transitions to English instruction across state and
  - prior exposure to mother-tongue instruction across language groups

DATA SOURCES

- Data from the 2012-2013 Ethiopian school survey, which is administered by Young Lives, are used
- We observe
  - basic household-, student-, and school-level characteristics
  - students' mother tongue and language of instruction at school
  - scores on math tests that are administered to grades 4 and 5 students
- The sample of analysis is restricted to
  - students who have attended the same school since grade 1
  - students who attend public schools

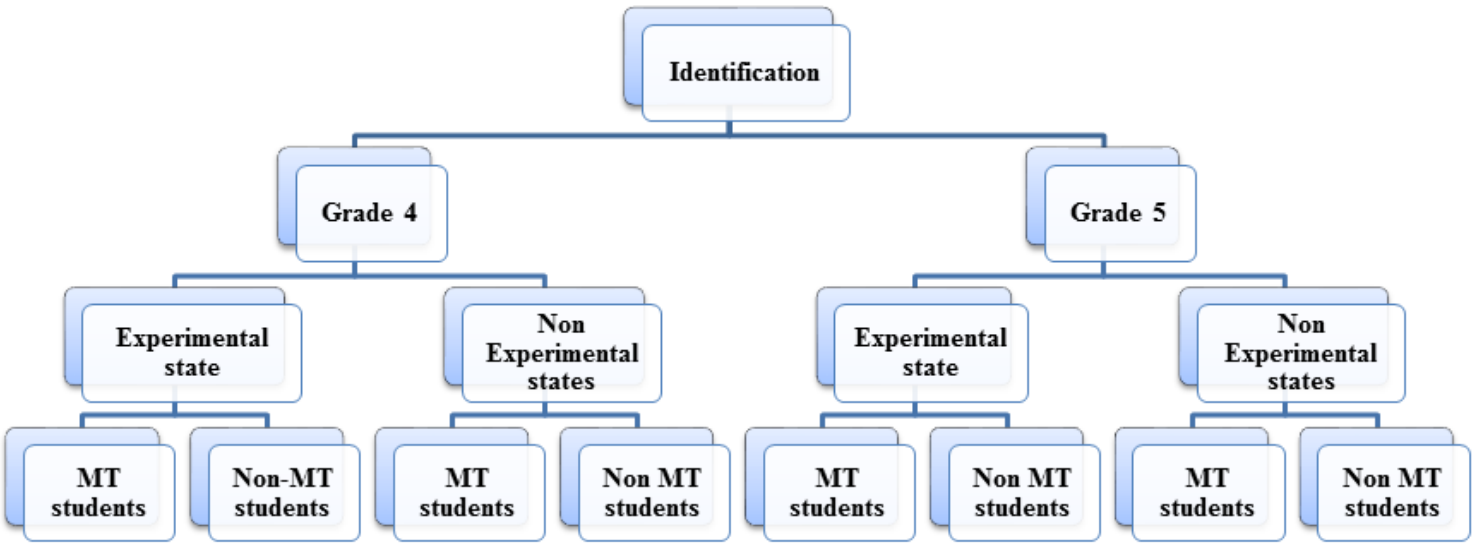
VARIABLES

- The dependent variable is students' test scores on math tests
- We control for a number of household, student, and school-level characteristics in the regression

Table 1 : Descriptive Statistics of Math Scores

	Experimental State		Non-experimental States	
	MT students	Non-MT students	MT students	Non-MT students
Math Z-score - Wave 2	0.192	0.018	0.144	0.051
	(0.691)	(0.061)	(0.465)	(0.045)
Math Z-score - Wave 1	0.091	0.009	0.131	0.007
	(0.123)	(0.012)	(0.218)	(0.701)
Observations	1642	698	3122	792

TRIPLE-DIFF MODEL



TRIPLE-DIFF MODEL

- We've estimated the following triple-diff equation

$$\begin{aligned}\Delta Score_{igs} = \beta_0 &+ \beta_1 Exp_s + \beta_2 After_{igs} + \beta_3 Treated_{igs} \\ &+ \beta_4 (Exp_s * After_{igs}) + \beta_5 (Exp_s * Treated_{igs}) \\ &+ \beta_6 (After_{igs} * Treated_{igs}) \\ &+ \beta_7 (Exp_s * After_{igs} * Treated_{igs}) \\ &+ \mathbf{X}_{igs}\boldsymbol{\gamma} + \phi + \psi + \epsilon_{igs},\end{aligned}$$

- where
  $\Delta Score = Score_{wave2} - Score_{wave1}$;
  Exp_s = experimental state dummy;
  $After_{igs}$ = dummy for grade 5 students;
  $Treated_{igs}$ = dummy for language-majority students;
  $\mathbf{X}_{igs}$ = a vector of control variables;
  ϕ and ψ are class and school fixed effects, respectively

Table 2 : Triple-differences Estimates

	(1)	(2)
Exp	0.113	0.101
	(0.162)	(0.153)
After	0.153***	0.150***
	(0.013)	(0.038)
Treated	0.163*	0.147*
	(0.096)	(0.077)
Exp ∗ After	0.200***	0.183***
	(0.018)	(0.026)
Exp ∗ Treated	0.215**	0.193**
	(0.089)	(0.096)
After ∗ Treated	0.228***	0.219*
	(0.071)	(0.116)
Exp ∗ After ∗ Treated	0.125***	0.114***
	(0.026)	(0.022)
Student- & school-level controls	Yes	Yes
Household-level controls	No	Yes
Observations	6254	6254
R-squared	0.511	0.538

FALSIFICATION TESTS

- In the falsification test
  - we restrict the sample to *non-experimental* state only
  - then, we randomly assign observations into *placebo* treatment and control groups
- In the falsification tests, the coefficient estimate of the interaction term, $Exp_s * After_{igs} * Treated_{igs}$, is insignificant
- This confirms that the positive treatment effect presented in the main (triple-diff) analysis is driven by learning in MT first

Table 3 : **Falsification Test:** Triple-differences Estimates

	(1)	(2)
Exp, placebo	0.055	0.062
	(0.162)	(0.105)
After	0.076**	0.082**
	(0.037)	(0.039)
Treated	0.079*	0.080
	(0.042)	(0.056)
Exp, *placebo* $*$ *After*	0.089	0.165
	(0.100)	(0.109)
Exp, *placebo* $*$ *Treated*	0.117	0.104
	(0.095)	(0.090)
After $*$ *Treated*	0.063*	0.082
	(0.038)	(0.053)
Exp, *placebo* $*$ *After* $*$ *Treated*	-0.018	0.006
	(0.021)	(0.016)
Student- & school-level controls	Yes	Yes
Household-level controls	No	Yes
Observations	3914	3914
R-squared	0.231	0.255

CONCLUSIONS

- We document whether learning in mother tongue first help students perform better after they transition to English instruction
- We exploit the variation in the timing of transition to English instruction and exposure to MT instruction by language group
- Using these variations, we estimate triple-differences model
- We've found that learning in MT first improves students performance later after they transition to English instruction
- Note that we only document here the short-term effect of learning in mother tongue first