

ECON B225: ECONOMIC DEVELOPMENT

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Article Brief Template

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- ☐ **Research Question**
- ☐ **Study Context**
- ☐ **Data Used**
- ☐ **Identification Strategy**
- ☐ **Findings**
- ☐ **Why Findings are Important/Why Matter**
- ☐ **Assessment of Weaknesses**

Human Capital and Education

Plan

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□ In-depth look at **Glewwe et al. (2009)**

▣ Minor factoids:

- Michael Kremer was awarded Nobel Prize in Economics in the past five years along with Esther Duflo and Abhijit Banerjee
- Paul Glewwe was a member of my dissertation committee

Outline for Glewwe et al.

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- **Research Question**
- **Motivation**
- **Prior Literature**
- **Data**
- **Identification Strategy**
- **Results**
 - ▣ What's the story?
- **Conclusion and contribution**
- **Reflection/Criticisms**

Research Question

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- **What would you say is the research question at the core of this paper?**
- **My characterization: Does having access to textbooks affect students' test scores in developing countries, and if so how much?**
 - ▣ Pretty simple, but that's it!
- **Why is this a development economics question?**

Human Capital and Education

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- **Human capital:** human attributes that contribute to economic production
 - ▣ Creativity, capacity for innovation, skill, etc.
- **Intuitive relationship between human capital development and TFP and efficiency**
- **Where does skill, capacity and creativity come from?**
 - ▣ Many places, but obvious answer: education
- **Leads to research into how to effectively improve education in poor countries**
 - ▣ Topic of Glewwe et al (2009)

Motivation

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- **Why would one want to know the answer to this question?**
 - ▣ NGOs and Ministries of Education see textbook access as a potential goal and a way to improve student outcomes
- **Obviously textbooks help, right?**
 - ▣ Not necessarily, why not?
- **What good are textbooks if students,**
 - ▣ Don't speak the language they're written in?
 - ▣ Can't read?
 - ▣ Aren't academically trained enough to use them?

Prior Literature

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- **Prior literature discussion comes later on page 122**
- **Prior literature indicates positive effects, but these are all retrospective studies that are nonexperimental**
 - ▣ What's the problem with this?
 - What are examples of omitted variables or reverse causality?
 - ▣ Thus they don't account for omitted variables or reverse causality $\Rightarrow$ Maybe this conclusion is wrong and biased by inability to account for this

Data

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- **The data come from students across 100 schools in grades 3-8**
- **From Western Province in Kenya (Teso and Busia Counties)**
- **Dependent variables**
 - ▣ Primarily student test scores testing a student's knowledge of the official curriculum in English, Math, and Science
 - ▣ Scores are normalized by subtracting the mean of the score and dividing by the standard deviation (p. 119)
 - Provides a distance in standard deviations a student scored from the mean. **A change in 0.1 SDs moves a student 4 percentiles**
- **Independent variable of interest**
 - ▣ Whether a student was in a school that received textbooks from an NGO



Figure 1: Busia Kenya Map



Figure 2: Port Victoria in Busia County, Kenya. Source: Wikipedia

Experimental Design

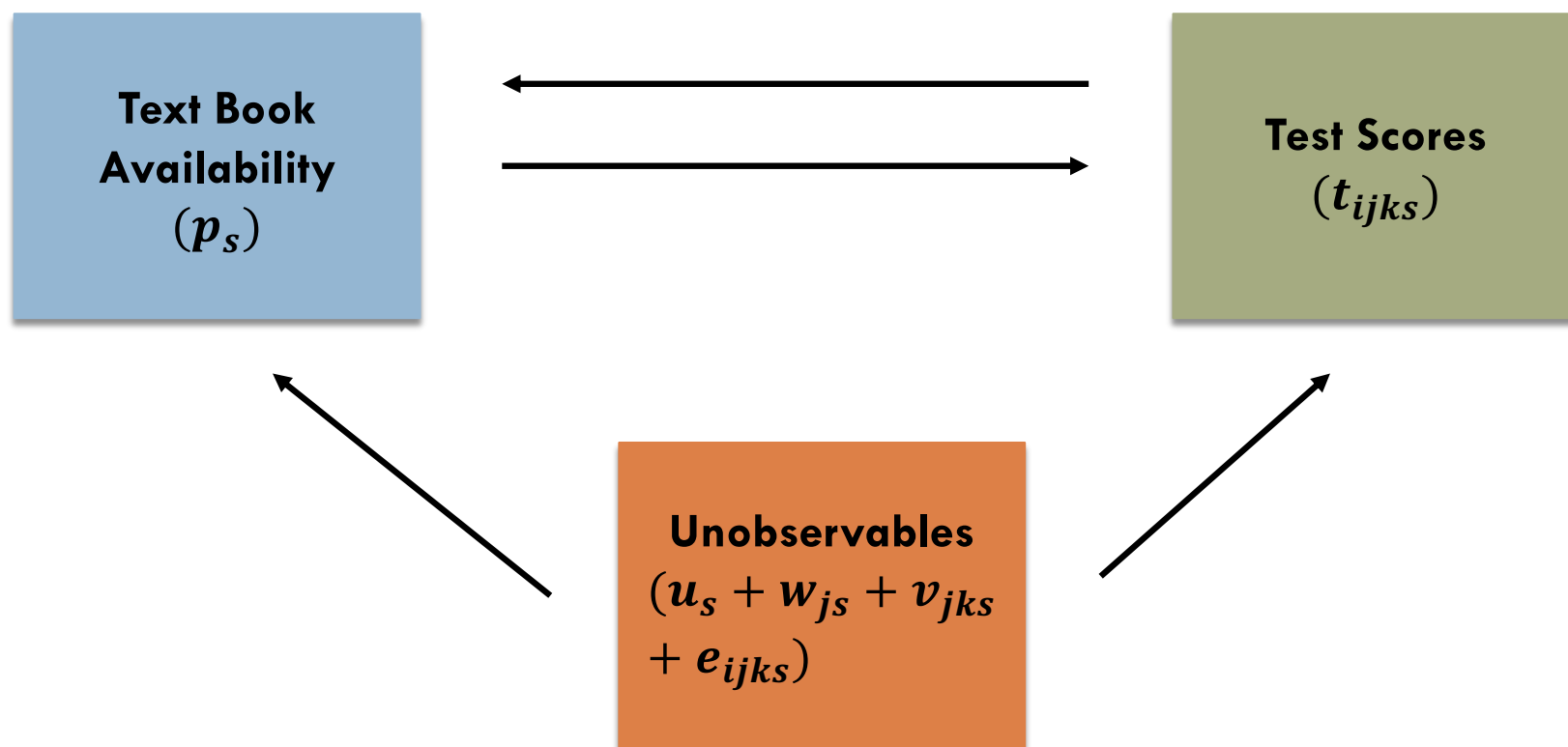
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- **100 schools chosen across Busia and Teso**
 - ▣ Deemed “needy” of textbooks
- **25 random schools get textbooks in 1996**
 - ▣ Remaining 75 are the control group in 1997
- **25 more received grants for textbooks (and other resources) in 1997**
 - ▣ Remaining 50 are control group in 1998, and so on
- **25 more received grants in 1998 and 25 more in 1999**

Identification Strategy: RCT

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- Usual worry is that textbook availability is correlated with unobservable variables



Error Term Decomposed

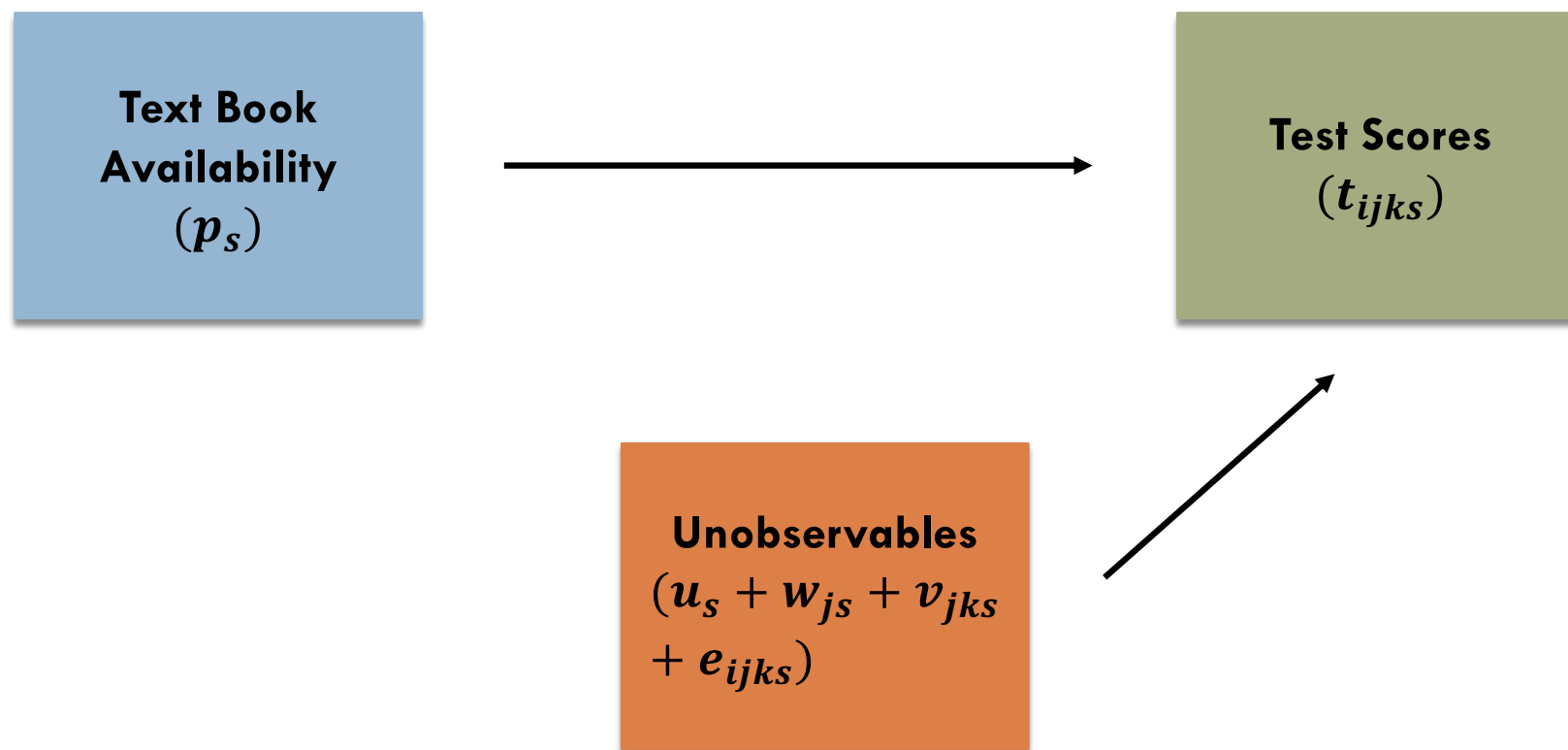
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- **Don't be confused by the notation: $u_s + w_{js} + v_{jks} + e_{ijks}$**
- **This is just saying there are different categories of variables in the error term:**
 - ▣ Variables at the school level: u_s
 - ▣ Variables at at the grade within school level w_{js}
 - ▣ Variables with the grade, subject and school level v_{jks}
 - ▣ Variables at the individual level e_{ijks}

Identification Strategy: RCT

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- But RCT removes concern about reverse causality and omitted variable bias



Identification Strategy

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Basic regression framework:

$$t_{ijks} = \alpha_{jk} + \boxed{\beta_{jk} p_s} + u_{jks} + e_{ijks} \quad (1)$$

$p_s = 1$ if school
received
textbooks,
 $p_s = 0$ if not

Highlighted estimates:

Fixed effects for grade and subject level. This
provides helpful statistical properties (this is not
essential for you to know)

t_{ijks}

$$= \alpha_{3E} D_{3E} + \alpha_{3M} D_{3M} + \alpha_{3S} D_{3S} + \dots + \alpha_{8E} D_{8E} + \alpha_{8M} D_{8M} + \alpha_{8S} D_{8S} + \boxed{\beta p_s} + u_s + v_{jks}$$

$+ e_{ijks}$

(In Paper Equation 3)

Results I

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□ Textbook availability increased! It should!

TABLE 3—STUDENT REPORTING ON AVAILABILITY OF SCHOOL-OWNED TEXTBOOKS IN GRADES 6–8

Year	Type of subject/grade combination	School issued you a textbook to use in class?		School allowed you to take the textbook home?	
		Textbook schools	Comparison schools	Textbook schools	Comparison schools
		(1)	(2)	(3)	(4)
2	Textbooks provided	62.4 %	7.7 %	52.8 %	2.5 %
	Textbooks not provided	8.6 %	7.1 %	5.4 %	1.9 %
3	Textbooks provided	72.0 %	28.3 %	63.5 %	9.4 %
	Textbooks not provided	23.4 %	11.7 %	17.4 %	6.4 %

Notes: These figures are averages over groups of grade/subject combinations, disaggregated according to whether the combination received textbooks from ICS. In both years, “textbooks provided” refers to English and math in grades 6 and 7 and science in grade 8, while “textbooks not provided” refers to science in grades 6 and 7 and English and math in grade 8. This information is available only for years 2 and 3, since the relevant student questionnaires were administered only in those years.

Results II

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□ Small and statistically insignificant effects of the textbooks on test scores.

TABLE 4—IMPACT OF TEXTBOOK PROGRAM ON NORMALIZED TEST SCORES

Dependent variable	Normalized test score ^{a b} (1)	Normalized test score ^b (2)	Normalized test score minus pretest score ^c (3)	Normalized test score minus pretest score ^c (4)
Textbook school	0.023 (0.087)	0.020 (0.104)	0.018 (0.053)	−0.046 (0.071)
Received a textbook	Y	Y	Y	Y
Region and sex dummies	1	2	1	2
Years exposed to textbooks	3–8	4–7	3–8	4–7
Grades	24,132	12,663	11,321	7,354
Observations				

Notes: Standard errors in parentheses.

^a Running the same regressions for individual subjects English, math, and science (not shown in this table), yields similar results, with the coefficients on textbooks never statistically significantly different from zero.

^b Sample includes all children enrolled in January of year 1 who took the relevant October/November test

^c Sample includes all children who were enrolled in January of year 1 and took the relevant October/November test as well as the pretest in January of year 1.

*** Significant at the 1 percent level.

** Significant at the 5 percent level.

* Significant at the 10 percent level.

Remember, 0.1 = 4 percentiles. This is saying that on average, being in a textbook school increased students' scores by <1 percentile

Worries for Bias

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□ **Selection Bias**

- Maybe students are switching out of control schools to get textbooks?
 - Better more motivated students would end up in textbook-receiving schools
- If this was true you'd expect to see a big dropout rate in the control schools and a big transfer in rate at the treated schools, but the data don't support this

□ **Attrition Bias**

- Maybe students are dropping out of the study in systematic ways
 - Bad students might be leaving?
- But again the data don't support this. There is very low dropout rates and no difference between treated and untreated schools

□ **Strategic promotion?**

- Even with this, the effect is small and not statistically significant

Results III

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□ Stronger students do better with the textbooks

TABLE 9—PROGRAM IMPACT ON NORMALIZED TEST SCORES, BY QUINTILE OF PRETEST SCORES

Years exposed	Quintile 1 (1)	Quintile 2 (2)	Quintile 3 (3)	Quintile 4 (4)	Quintile 5 (5)
1	−0.049 (0.064)	−0.021 (0.069)	0.032 (0.073)	0.142* (0.079)	0.218** (0.096)
2	−0.077 (0.081)	−0.109 (0.094)	−0.089 (0.104)	0.021 (0.101)	0.173 (0.131)

Notes: Each row represents five random effects regressions, one for each quintile (based on pretest scores from January of year 1), of post-test scores on a dummy variable indicating whether a child is in a textbook school and on dummy variables for region and sex. The sample consists of all children enrolled in January of year 1 who took both the pretest in year 1 and the relevant post-test. All results are aggregated over all grade/subject combinations that received textbooks.

*** Significant at the 1 percent level.

** Significant at the 5 percent level.

* Significant at the 10 percent level.

Results IV

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□ Other Educational Outcomes

TABLE 10—PROMOTION, REPETITION, AND DROPPING OUT FROM YEAR 1 TO YEAR 2

	Lower grades (3–7)		Upper grade (8)	
	Textbook schools	Comparison schools	Textbook schools	Comparison schools
	(1)	(2)	(3)	(4)
Stayed, promoted	0.53	0.53		
Finished primary, no secondary			0.32***	0.41
Entered secondary			0.43**	0.38
Stayed, repeated	0.21	0.21	0.16	0.14
Dropped out	0.17	0.17	0.01	0.03
Transferred out	0.08	0.09	0.06	0.04
Number of students	5,009	4,838	447	440

Notes: For promotion, repetition and dropping out, comparison schools are the 25-school comparison group. Lower and upper grades refer to grade of pupils in year 1. Tests for statistical significance are based on probits with school random effects.

*** Difference with comparison group significant at the 1 percent level.

** Difference with comparison group significant at the 5 percent level.

* Difference with comparison group significant at 10 percent.

What's the Story Here?

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- **Simply providing textbooks isn't enough to improve learning outcomes for the majority of students if there is "curriculum mismatch"**
- **Only students already achieving at a high level benefit**
 - ▣ Likely because others are not equipped to take advantage of the new resource
- **Provision of resources in schools likely won't help broad improvements in educational performance unless accompanied by broader improvements in the system (like what?)**

Conclusion and Contribution

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- **NGOs and policymakers should think carefully about how to add resources to a school system in a developing country**
- **Simply adding resources to a system will likely produce no broad benefit if students aren't equipped to use them**
 - ▣ Requires complementarities in the system
- **Implies a reassessment of prior work that (possibly) mistakenly suggests that textbook availability results in improved outcomes**

Some Questions

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- **What do you find convincing about the paper?**
- **What don't you find convincing?**
- **What does this say about education policy directed at development outcomes?**
- **How does this inform some questions related to TFP and Solow?**

The Consensus from Econ. World

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- **Strong, straightforward and elegant paper**
- **No worries about causal identification b/c RCT**
- **Important contribution credibly contradicting prior consensus on role of textbooks on learning**
- **Is this just obvious?**
- **If education is a pathway to improved development there isn't any low-hanging fruit here**
 - ▣ Perhaps a deceptive conclusion:
 - Textbooks are “effective”, maybe there is low-hanging fruit if we just revise the textbooks?