ECONOMIC POLICY ISSUES

Education – Charter Schools
Sample Teaching Slides III

WHO BENEFITS FROM KIPP?

Angrist, Dynarski, Kane, Pathak and Walters (2012)

Background: Charter schools vs. Traditional public schools

- Can schools alone substantially reduce racial achievement gaps? Maybe they can. One potential solution is charter schools.

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- **KIPP (Knowledge is Power Program)** is the largest charter management organization and **targets low-income and minority students**.

- As opposed to traditional public schools, KIPP schools
  1. are publicly funded but privately operated
  2. are subject to fewer rules and regulations, but are accountable for academic results
  3. subscribe to an approach called "**No Excuses**":
     a) Focus on traditional math and reading skills
     b) Long school day and year
     c) Selective teacher hiring
     d) Strict behaviour norms
     e) Strong student work ethic

Background: KIPP Lynn vs. Lynn Public Schools (LPS)

- **KIPP (Knowledge is Power Program)** is the largest charter management organization and targets low-income and **minority students**.
- The study focuses on KIPP Academy Lynn (KIPP Lynn), the only KIPP school in New England, Massachusetts.
- The other publicly funded option for local residents is **Lynn Public Schools (LPS).**
- Most KIPP Lynn students live in Lynn and would otherwise attend LPS.

Background: KIPP Lynn vs. Lynn Public Schools (LPS)

- Similarities:
  1. High proportion of non-white students who are also eligible for free or reduced-priced lunch
  2. A fifth of the students in LPS and KIPP Lynn are categorized as **LEP** (Limited English Proficiency)
  3. Another fifth are **SPED** (Special Education) students
  4. Student-teacher ratios at around 14

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- Differences:
  1. KIPP Lynn operates under the "No Excuses" approach
  2. Reward 'paychecks' points for good work (spent on field trip and other perks)
  3. Students, parents, and teachers sign a "Commitment to Excellence"
  4. KIPP Lynn's teachers are NOT unionized, work long day, are younger and are expected to respond to students' phone calls in the evening

The Debate

Proponent of KIPP:

KIPP substantially improves academic performance of its students.

Opponent of KIPP:

1. Results achieved by students at KIPP are driven by **selection bias**.
2. KIPP only benefits relatively high-achieving and motivated students but not the disadvantageous groups such as English language learners (LEP) and special education (SPED) students.

Research methodology

Angrist et al (2012) estimates the effect of **KIPP Lynn** on the Massachusetts Comprehensive Assessment System (MCAS) scores, a state-wide standardized Math and English language arts (ELA) test scores, of its students.

Why?

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Why?

To address the two main criticisms:

1. **Results achieved by students in KIPP are driven by selection bias**

   State-wide regulations require all charter schools to use a lottery when oversubscribed.

   From 2005 to 2008, admissions lotteries are used to develop a quasi-experimental research design.

   Randomized lotteries help address the problem of selection bias.

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Why?

To address the two main criticisms:

2. **KIPP only benefits relatively high-achieving and motivated students**

   While sharing many features with other KIPP schools across the US, KIPP Lynn enrols a high proportion of Hispanic, limited English proficiency (LEP), and special education (SPED) students.

   This allows the study to estimate achievement gains for these students.

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Note:
KIPP Lynn shares many features with other KIPP schools.

According to the authors:

"*We might therefore expect similar gains and interactions to emerge from a larger sample of KIPP schools.*"

Are the findings externally valid?

The study focuses on one school and attributes the observed students' performance gains to the program features common to all KIPP schools.

Data and Empirical Framework

- **Sample**: KIPP Lynn first-time applicants into 5th grade (Fall 2005 through 2008)
  (5th grade is KIPP's entry point)

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- **However, omit the following applicants**:
  - applicants with siblings enrolled in KIPP (guaranteed entry),
  - late applicants (missed the lotteries),
  - older applicants (entered late, if at all), and
  - students with missing demographic data when matched to the Student Information Management System (SIMS).

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  - students with missing demographic data when matched to the Student Information Management System (SIMS).

- From 5th to 8th grade, these students were tested in math and ELA.
  Use their **normalized MCAS scores** (state-wide mean = 0, sd = 1) to proxy their academic performance

Data and Empirical Framework

- Column (1), (2), and (3) report the **4th grade means** of demographic characteristics and test scores.

- Column (4) reports the β_1 of:

  $$\boldsymbol{row = \beta_0 + \beta_1 1_{\{winner\}} + e}$$

  Why?

  If lottery is truly random, there should be no correlation between being a winner/loser and any of the observed characteristics or test scores.

- Column (5) adds all demographic controls to the regression above.

Table 1: Descriptive Statistics and Covariate Balance

	Means			Balance regressions	
	Lynn Public 5th graders	KIPP Lynn 5th graders	KIPP Lynn lottery applicants	No controls	Demographic controls
	(1)	(2)	(3)	(4)	(5)
Hispanic	0.418	0.565	0.538	-0.052	-
				(0.053)	
Black	0.173	0.235	0.254	0.027	-
				(0.044)	
White	0.296	0.168	0.182	-0.010	-
				(0.040)	
Asian	0.108	0.021	0.022	0.026*	-
				(0.015)	
Female	0.480	0.474	0.484	-0.010	-
				(0.054)	
Free/reduced price lunch	0.770	0.842	0.825	-0.030	-
				(0.041)	
Special Education	0.185	0.189	0.197	-0.013	-
				(0.042)	
Limited English Proficiency	0.221	0.172	0.206	-0.075	-0.060
				(0.047)	(0.044)
Baseline Math Score	-0.307	-0.336	-0.390	0.097	0.066
				(0.114)	(0.109)
Baseline Verbal Score	-0.356	-0.399	-0.438	0.054	0.028
				(0.118)	(0.109)
Fourth Grade Applicant			0.768	0.056	0.068
				(0.046)	(0.047)
F-value from joint test				0.820	0.998
p-value from F-test				0.621	0.409

Data and Empirical Framework

Some notable statistics:

1. KIPP Lynn admitted high proportion of Black and Hispanic applicants.

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4. Characteristics cannot be predicted based on lottery outcome (i.e., lottery winners were randomly selected from the pool of lottery applicants).

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Data and Empirical Framework: Attrition

Another problem that could lead to selection bias is '**Attrition**'.

- Is the attrition process random? Perhaps lottery losers are more likely to enrol in private school or leave state

  → More likely to be missing from the MCAS state-wide test score data.

- Because we are comparing between treatment and control groups

  → **Unobserved elements in the control group** can lead to biased results.

Table 3: Attrition

		Differential Follow-up (winner - loser)		
	Proportion of non-offered with MCAS scores	Basic controls	Demographics	Demographics and baseline scores
Subject	(1)	(2)	(3)	(4)
Math	0.851	0.052*	0.041	0.044
		(0.032)	(0.031)	(0.030)
		971	971	957
ELA	0.855	0.048	0.031	0.041
		(0.031)	(0.032)	(0.031)
		971	971	958

Notes: This table reports coefficients from regressions of an indicator variable equal to one if the outcome test score is non-missing on an indicator variable equal to one if the student won the lottery. Grades are pooled, and all regressions include grade dummies. The regression in column (2) includes dummies for outcome grade, year of baseline, application grade, and year of application interacted with a contemoraneous sibling applicant dummy. Column (3) adds demographic variables, and column (4) adds baseline test scores. The sample is restricted to cohorts for which we should observe follow-up scores and excludes applicants with sibling priority. Robust standard errors (clustered at the student level) are reported in parentheses.

* significant at 10%; ** significant at 5%; *** significant at 1%

Data and Empirical Framework: Attrition

How to detect non-random attrition?

Answer the question:
"Are lottery results correlated with missing data over time?"

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Data and Empirical Framework: Attrition

How to detect non-random attrition?

Answer the question:
"Are lottery results correlated with missing data over time?"

Regression:

$$1_{\{score \neq missing\}} = \beta_0 + \beta_1 \mathbf{1}_{\{winner\}} + controls + e$$

Result:
Probability of non-missing score is 85% for lottery losers.

Being a winner does NOT increase the probability, esp after accounting for controls.

→ **Attrition is random.**

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Two-Stage Least Squares (2SLS) Approach

Estimating the causal effect of attending KIPP Lynn on test scores.

The Main equation:

$$y_{igt} = \alpha_t + \beta_g + \sum_j \delta_j d_{ij} + \gamma' X_i + \boldsymbol{\rho} s_{igt} + \epsilon_{igt}$$

where

- y_{igt} is the scores of student i tested in year t in grade g.
- s_{igt} is the years spent at KIPP Lynn as of the test date.
- ρ is the average treatment effect.
- α_t and β_g are year-of-test and grade-of-test effects.
- X_i is a vector of demographic controls.
- d_{ij} is three of the four KIPP Lynn application cohorts (j for cohort).

Two-Stage Least Squares (2SLS) Approach

Estimating the causal effect of attending KIPP Lynn on test scores.

The First-Stage equation:

$$s_{igt} = \lambda_t + \kappa_g + \sum_j \mu_j d_{ij} + \Gamma' X_i + \boldsymbol{\pi} Z_i + \eta_{igt}$$

where

- s_{igt} is the years spent at KIPP Lynn as of the test date.
- Z_i is the randomly assigned lottery offer dummy (**an instrument**).
- π is the first stage effect.
- λ_t and κ_g are year-of-test and grade-of-test effects.

Two-Stage Least Squares (2SLS) Approach

We have

The Main equation:

$$y_{igt} = \alpha_t + \beta_g + \sum_j \delta_j d_{ij} + \gamma' X_i + \boldsymbol{\rho} s_{igt} + \epsilon_{igt} \quad (1)$$

The First-Stage equation:

$$s_{igt} = \lambda_t + \kappa_g + \sum_j \mu_j d_{ij} + \Gamma' X_i + \boldsymbol{\pi} Z_i + \eta_{igt} \quad (2)$$

To get $\boldsymbol{\rho}$, we have to first construct the reduced form generated by this system of equations by substituting (2) into (1).

Two-Stage Least Squares (2SLS) Approach

Substitute (2) into (1):

The reduced form:

$$y_{igt} = \alpha_t + \beta_g + \sum_j \delta_j d_{ij} + \gamma' X_i + \rho\left(\lambda_t + \kappa_g + \sum_j \mu_j d_{ij} + \Gamma' X_i + \boldsymbol{\pi} Z_i + \eta_{igt}\right) + \epsilon_{igt}$$

$$= \alpha_t + \beta_g + \sum_j \delta_j d_{ij} + \gamma' X_i + \rho\left(\lambda_t + \kappa_g + \sum_j \mu_j d_{ij} + \Gamma' X_i\right) + \boldsymbol{\rho\pi} Z_i + (\rho\eta_{igt} + \epsilon_{igt})$$

Two-Stage Least Squares (2SLS) Approach

Substitute (2) into (1):

The reduced form:

$$y_{igt} = \alpha_t + \beta_g + \sum_j \delta_j d_{ij} + \gamma' X_i + \rho\left(\lambda_t + \kappa_g + \sum_j \mu_j d_{ij} + \Gamma' X_i\right) + \boldsymbol{\rho\pi} Z_i + (\rho\eta_{igt} + \epsilon_{igt})$$

Let $\boldsymbol{\tau} = \boldsymbol{\rho\pi}$ and name it the "**reduced form effect**".

Two-Stage Least Squares (2SLS) Approach

Now, we estimate the first stage and the reduced form to get $\hat{\tau}$ and $\hat{\pi}$:

The first-stage equation:

$$s_{igt} = \lambda_t + \kappa_g + \sum_j \mu_j d_{ij} + \Gamma' X_i + \boldsymbol{\pi} Z_i + \eta_{igt} \qquad (2)$$

The reduced form:

$$y_{igt} = \alpha_t + \beta_g + \sum_j \delta_j d_{ij} + \gamma' X_i + \rho\left(\lambda_t + \kappa_g + \sum_j \mu_j d_{ij} + \Gamma' X_i\right) + \boldsymbol{\tau} Z_i + \left(\rho\eta_{igt} + \epsilon_{igt}\right)$$

Since $\boldsymbol{\tau} = \boldsymbol{\rho}\boldsymbol{\pi}$, the average treatment effect $\boldsymbol{\rho}$ can be derived: $\widehat{\boldsymbol{\rho}} = \frac{\hat{\boldsymbol{\tau}}}{\hat{\boldsymbol{\pi}}}$

Empirical Results

First Stage estimates:

Lottery winners spent an average **1.2 years more at KIPP** than losers (robust).

NOTE:
The first-stage estimates are reduced by the fact that

- Some winners did not enrol in KIPP
- Some KIPP students left before finishing
- Some losers ended up in KIPP later

Table 4: Lottery Results

		all applicants				4th grade applicants		Lynn public schools at baseline	
		First Stage	Reduced Form	2SLS	OLS	2SLS	OLS	2SLS	OLS
Subject	Controls	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Math	Basic	1.222***	0.431***	0.353***	0.304***	0.368***	0.272***	0.342***	0.308***
		(0.063)	(0.116)	(0.095)	(0.048)	(0.100)	(0.052)	(0.109)	(0.054)
		865	865	865	865	752	752	704	704
	Demographics	1.232***	0.392***	0.318***	0.316***	0.356***	0.302***	0.309***	0.336***
		(0.065)	(0.105)	(0.084)	(0.041)	(0.087)	(0.045)	(0.098)	(0.046)
		865	865	865	865	752	865	704	704
	Demographics & Baseline Scores	1.228***	0.425***	0.346***	0.317***	0.336***	0.319***	0.341***	0.346***
		(0.066)	(0.066)	(0.052)	(0.032)	(0.055)	(0.036)	(0.064)	(0.038)
		856	856	856	856	746	746	696	696
ELA	Basic	1.223***	0.183	0.150	0.170***	0.188*	0.138***	0.217*	0.168***
		(0.063)	(0.117)	(0.094)	(0.049)	(0.099)	(0.052)	(0.115)	(0.057)
		866	866	866	866	751	751	705	705
	Demographics	1.235***	0.118	0.095	0.172***	0.152*	0.164***	0.150	0.180***
		(0.066)	(0.097)	(0.077)	(0.041)	(0.080)	(0.043)	(0.092)	(0.047)
		866	866	866	866	751	866	705	705
	Demographics & Baseline Scores	1.234***	0.149**	0.120**	0.172***	0.111*	0.168***	0.132*	0.182***
		(0.066)	(0.073)	(0.058)	(0.031)	(0.059)	(0.033)	(0.068)	(0.036)
		856	856	856	856	744	744	698	698

Notes: This table reports the coefficients from regressions of test scores on years spent at KIPP Academy Lynn. The sample uses students who applied to KIPP Lynn between 2005 and 2008. It is restricted to students with baseline demographic characteristics and excludes applicants with sibling priority. Grades are pooled, and all regressions include grade dummies. All regressions also include year of test dummies, year of application dummies interacted with a contemporaneous sibling applicant dummy, and grade of application dummies. Some regressions add demographic controls, which include dummies for female, black, hispanic, asian, other race, special education, limited english proficiency, free/reduced price lunch, and a female*minority interaction. Columns (1)-(3) report the first stage, reduced from, and 2SLS coefficients from instrumenting years in KIPP Lynn using the lottery win/loss dummy. Column (4) reports the coefficients from OLS regressions of test scores on years in KIPP Lynn and controls. Columns (5) and (6) report 2SLS and OLS results using only students that applied to KIPP Lynn in the year after finishing 4th grade. Columns (7) and (8) report 2SLS and OLS results using only students that indicated Lynn Public School attendance prior to the lottery on their KIPP Lynn applications. Robust standard errors (clustered at the student level) are reported in parentheses.

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Empirical Results

Reduced Form estimates:

- Compared to lottery losers, winners score:
  - **0.4σ higher in Math,** and
  - **0.15σ higher in ELA** (with demographic and baseline score controls)

Table 4: Lottery Results

		all applicants				4th grade applicants		Lynn public schools at baseline	
		First Stage	Reduced Form	2SLS	OLS	2SLS	OLS	2SLS	OLS
Subject	Controls	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Math	Basic	1.222***	0.431***	0.353***	0.304***	0.368***	0.272***	0.342***	0.308***
		(0.063)	(0.116)	(0.095)	(0.048)	(0.100)	(0.052)	(0.109)	(0.054)
		865	865	865	865	752	752	704	704
	Demographics	1.232***	0.392***	0.318***	0.316***	0.356***	0.302***	0.309***	0.336***
		(0.065)	(0.105)	(0.084)	(0.041)	(0.087)	(0.045)	(0.098)	(0.046)
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	Demographics & Baseline Scores	1.228***	0.425***	0.346***	0.317***	0.336***	0.319***	0.341***	0.346***
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ELA	Basic	1.223***	0.183	0.150	0.170***	0.188*	0.138***	0.217*	0.168***
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Empirical Results

2SLS estimates:

Recall

$$2SLS\ estimate(\rho) = \frac{Red.Form\ (\tau)}{First\ stage\ (\pi)}$$

How to interpret?

Table 4: Lottery Results

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Empirical Results

2SLS estimates:

Recall

$$2SLS\ estimate(\rho) = \frac{Red.Form\ (\tau)}{First\ stage\ (\pi)}$$

How to interpret?

Consider the first row:

→ We expect a winner to attend KIPP Lynn **1.222 years longer** and score **0.431σ higher** in math test.

This implies that math scores increase by about

$$\hat{\rho} = \frac{0.431\sigma}{1.222\ years} = \mathbf{0.35\sigma/year}$$

at KIPP Lynn.

Table 4: Lottery Results

		all applicants				4th grade applicants		Lynn public schools at baseline	
		First Stage	Reduced Form	2SLS	OLS	2SLS	OLS	2SLS	OLS
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Empirical Results

2SLS estimates:

- For ELA test, the effect is 0.12σ **higher** score for winners per year spent at KIPP Lynn (after adding all controls).

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Empirical Results

2SLS estimates:

- For ELA test, the effect is 0.12σ **higher** score for winners per year spent at KIPP Lynn (after adding all controls).
- Authors note that these effects are similar to results from a sample of charter schools in Boston in Abdulkadiroglu et al (2009).
- OLS estimates are close to the 2SLS estimates, which suggests that selection bias (due to compliance issue) is minor.

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		all applicants				4th grade applicants		Lynn public schools at baseline	
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Empirical Results

Addressing other concerns:

1. Older applicants are perhaps less likely than 4th grade applicants to have accepted an offer since they were required to repeat their current grade.

   (5) and (6) suggest this is not a problem.

2. Students coming from outside of LPS have lower match rates from lottery data to SIMS data.

   (7) and (8) suggest this is also not a concern.

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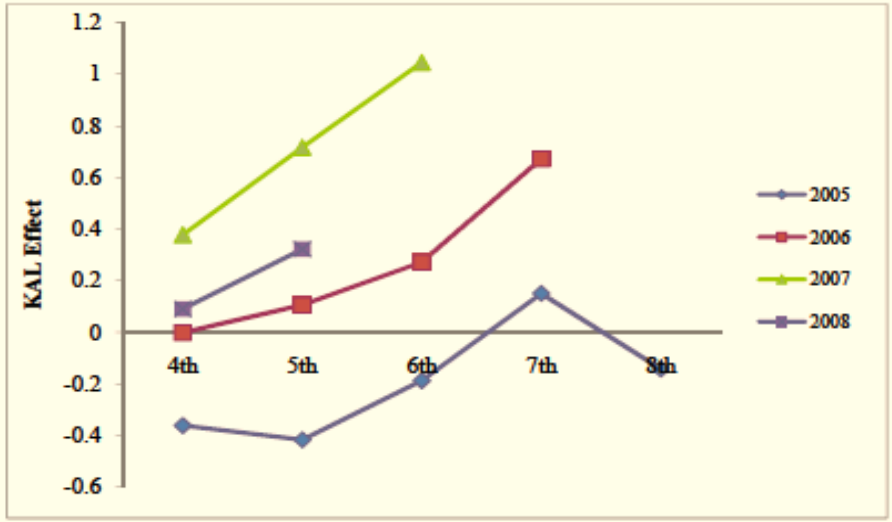
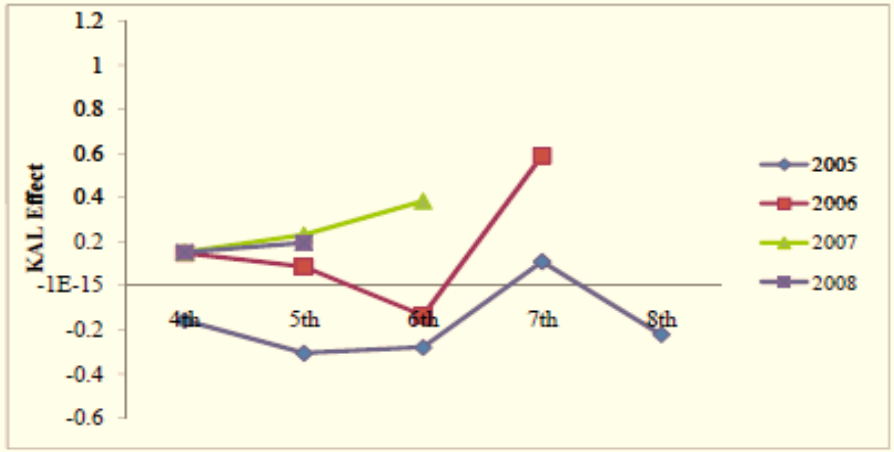
Empirical Results: by cohort and grade over time

Does the KIPP Lynn effect increase over time?

Figure 1



A. Math Reduced Form



B. ELA Reduced Form

Notes: This figure plots the coefficients from a regression of test scores on the lottery offer dummy interacted with dummies for grade of test*application year. Basic and demographic controls are included.

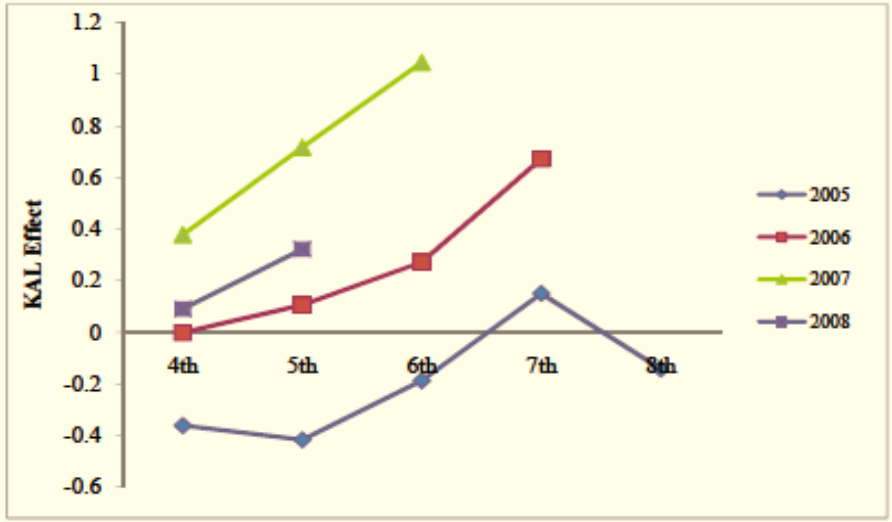
Empirical Results: by cohort and grade over time

Does the KIPP Lynn effect increase over time?

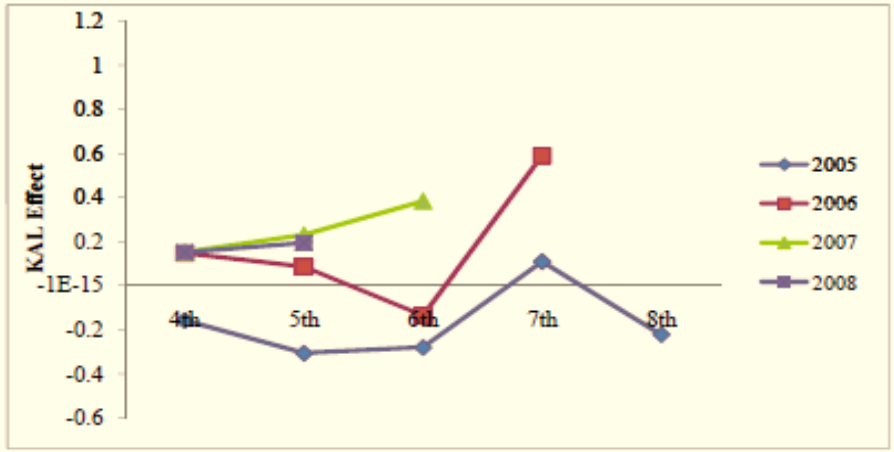
Plot reduced form estimates by cohort and grade for models with demographic controls.

- The top panel suggests a cumulative effect for math score.
- The bottom figure shows less consistent results due to smaller pooled estimates for ELA. Effects are smaller and take longer to emerge.
- Note that in 8th grade (for the first cohort admitted into KIPP Lynn), the effect is negative (but insignificant).

Figure 1



A. Math Reduced Form



B. ELA Reduced Form

Notes: This figure plots the coefficients from a regression of test scores on the lottery offer dummy interacted with dummies for grade of test*application year. Basic and demographic controls are included.

Empirical Results: by subgroups

KIPP Lynn effect on the disadvantageous groups:

Table 5: Lottery Results in Subsamples

Subject	Controls	LEP (1)	Non-LEP (2)	SPED (3)	Non-SPED (4)	Hispanic (5)	Non-hispanic (6)
Math	Basic	0.700***	0.208**	0.484**	0.298***	0.413***	0.247
		(0.182)	(0.101)	(0.207)	(0.092)	(0.118)	(0.150)
		132	733	175	690	462	403
	Demographics	0.628***	0.254***	0.527**	0.271***	0.302***	0.358**
		(0.197)	(0.093)	(0.215)	(0.087)	(0.106)	(0.152)
		132	733	175	690	462	403
	Demographics and Baseline Scores	0.451***	0.312***	0.441***	0.325***	0.346***	0.331***
		(0.155)	(0.056)	(0.146)	(0.053)	(0.074)	(0.076)
		131	725	174	682	457	399
ELA	Basic	0.457**	-0.016	0.346	0.077	0.217*	0.004
		(0.203)	(0.095)	(0.216)	(0.087)	(0.117)	(0.157)
		131	735	176	690	463	403
	Demographics	0.416**	0.019	0.220	0.038	0.068	0.119
		(0.183)	(0.084)	(0.216)	(0.079)	(0.093)	(0.150)
		131	735	176	690	463	403
	Demographics and Baseline Scores	0.384***	0.051	0.298*	0.049	0.121	0.086
		(0.140)	(0.062)	(0.162)	(0.058)	(0.075)	(0.099)
		130	726	174	682	457	399

Notes: This table reports results analogous to the 2SLS estimates in Table 4. The reported coefficients are 2SLS estimates in subsets of the lottery sample. The sample for each regression is restricted to individuals who were classified as limited english proficient (LEP), special education (SPED), or Hispanic at baseline in columns (1) , (3) and (5), compared to those who were not in columns (2) , (4) and (6), respectively. The LEP estimation sample includes 79 students, while the non-LEP sample includes 319. The SPED estimation sample includes 78 students, while the non-SPED sample includes 320. The Hispanic estimation sample includes 220 students, while the non-Hispanic sample includes 178. Robust standard errors (clustered at the student level) are reported in parentheses.

* significant at 10%; ** significant at 5%; *** significant at 1%

Empirical Results: by subgroups

KIPP Lynn effect on the disadvantageous groups:

- Relative to Non-LEP, LEP students gain more in math score per year at KIPP Lynn.

  The same can be said for the SPED vs Non-SPED comparison.

Table 5: Lottery Results in Subsamples

		LEP	Non-LEP	SPED	Non-SPED	Hispanic	Non-hispanic
Subject	Controls	(1)	(2)	(3)	(4)	(5)	(6)
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Empirical Results: by subgroups

KIPP Lynn effect on the disadvantageous groups:

- Relative to Non-LEP, LEP students gain more in math score per year at KIPP Lynn.

  The same can be said for the SPED vs Non-SPED comparison.

- The ELA score gains come almost entirely from the LEP.

Table 5: Lottery Results in Subsamples

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Empirical Results: Heterogeneous Treatment Effect

Rothstein (2004, p. 82) writes: *"They select from the top of the ability distribution those lower-class children with innate intelligence, well-motivated parents, or their own personal drives, and give these children educations they can use to succeed in life."*

Table 6: Baseline Test Score Interactions

	Baseline Scores		Demographics + Scores	
	Main effect	Interaction	Main effect	Interaction
Subject	(1)	(2)	(3)	(4)
Math	0.362***	-0.087**	0.367***	-0.106***
	(0.057)	(0.043)	(0.054)	(0.041)
	856		856	
ELA	0.128**	-0.147***	0.139**	-0.157***
	(0.064)	(0.051)	(0.057)	(0.045)
	856		856	

Notes: This table reports results analogous to the 2SLS estimates in Table 4, but specifications now include an interaction of baseline test score with years at KIPP Academy Lynn. These regressions use the KIPP Lynn offer dummy and offer*baseline score as instruments for years in KIPP Lynn and the interaction term. A main effect of baseline test score is also included in all regressions. Baseline scores are mean-zero in the estimation sample so that the main effects of years in KIPP Lynn are at the mean. Robust standard errors (clustered at the student level) are reported in parentheses.

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Table 6 adds an interaction between baseline (4th grade) scores and years at KIPP Lynn.

$$y_{igt} = \cdots + \boldsymbol{\rho} s_{igt} + \boldsymbol{\omega} s_{igt} \times base\ score_{igt} + \epsilon_{igt}$$

If KIPP Lynn raises achievement more for weaker students, we expect $\boldsymbol{\omega} < \mathbf{0}$.

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This is exactly the case.

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Empirical Results: School Switching

Perhaps the gains are driven by high rates of exit from KIPP.

That is, only good students stay.

How to test?

Table 8: School Switching Regressions

	Mean for non-offered students	Differential Follow-up (winner - loser)		
		Basic controls	Demographics	Demographics and baseline scores
	(1)	(2)	(3)	(4)
Any switch	0.504	-0.278***	-0.291***	-0.294***
		(0.044)	(0.044)	(0.045)
		419	419	412
6th grade school is different from 5th	0.855	-0.495***	-0.503***	-0.509***
		(0.061)	(0.060)	(0.059)
		294	294	291
Any switch excluding 5th to 6th transition	0.081	-0.004	-0.006	-0.004
		(0.033)	(0.033)	(0.034)
		419	419	412

Notes: This table reports coefficients from regressions of an indicator variable equal to one if a student switched schools on an indicator variable equal to one if the student won the KIPP Academy Lynn lottery. The dependent variable in the first row is one if a student ever moves from one observed school to another from 4th to 8th grade, either within a school year or between school years. The dependent variable in the second row is one if a student switches schools between 5th and 6th grade; only observations where both schools are observed are used. The dependent variables in the the third row is 1 if a student switches schools at any time besides the transition from 5th to 6th grade. The regressions in column (2) include dummies for outcome grade, year of baseline, application grade, and application year interacted with a contemporaneous sibling applicant dummy. Column (3) adds demographic variables, and column (4) adds baseline Math and ELA scores. The sample is restricted to cohorts for which we should observe follow-up test scores and excludes applicants with sibling priority. Robust standard errors are reported in parentheses.

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$$1_{\{switch\ school\}} = \beta_0 + \beta_1 \mathbf{1}_{\{winner\}} + controls + e$$

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Taking into account the fact that LPS students switch from elementary to middle school when transiting from 5th to 6th grade,

we see NO difference in switching between winners and losers.

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