A DISCONTINUOUS PIECEWISE LATENT GROWTH MODEL TO STUDY THE EFFECTS OF A COLLEGE ADMISSIONS TEST OVERHAUL

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POLICY CONTEXT

COLLEGE ADMISSIONS TESTS

- Chile has relied on college admissions tests to grant access to public and privates institutions since 1960, tests that were modeled after the American SAT
- College admissions tests are administered once a year, simultaneously across the country to all test takers
- By the end their senior year high school graduates take the test (approx. 250,000 students a year)

APPLICATION AND ADMISSIONS PROCESS

- Centralized and automatized system for college applications an admissions
  - Allows students to make choices and set priorities of majors and colleges
  - Make college admissions decisions according to a set of colleges' predefined criteria
- Up until 2013, college admissions test scores and high school GPA were the only selection criteria for college admissions

TEST OVERHAUL

- Up until 2003 college admissions tests were aptitude-based
- There was a consistent test score gap on students' on the test according to school sector (e.g. Koljatic & Silva, 2006, 2013; OECD & WB, 2009)
- Evidence from the UC System revealed that knowledge-based test were less correlated with students' SES (Atkinson, 2001; Geiser & Studley, 2002)
- Chilean authorities decided to change college admissions tests to measure the knowledge about the national curriculum content

PURPOSE OF THE STUDY

To investigate whether the college admissions ***test overhaul*** resulted in a ***decreased test score gaps*** among private, subsidized, and public schools.

METHODS

DATA

- Source: Data provided by DEMRE, the official agency in charge of the administration of college admissions tests
- Cross-sectional datasets: 2000 -2013
- Datasets contain student individual- and school-level information

VARIABLES

School test score means (language and math tests)

2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
470.3	465.0	468.7	468.5	470.0	472.0	474.5	482.7	482.9	487.1	491.6	490.9	490.1	491.1

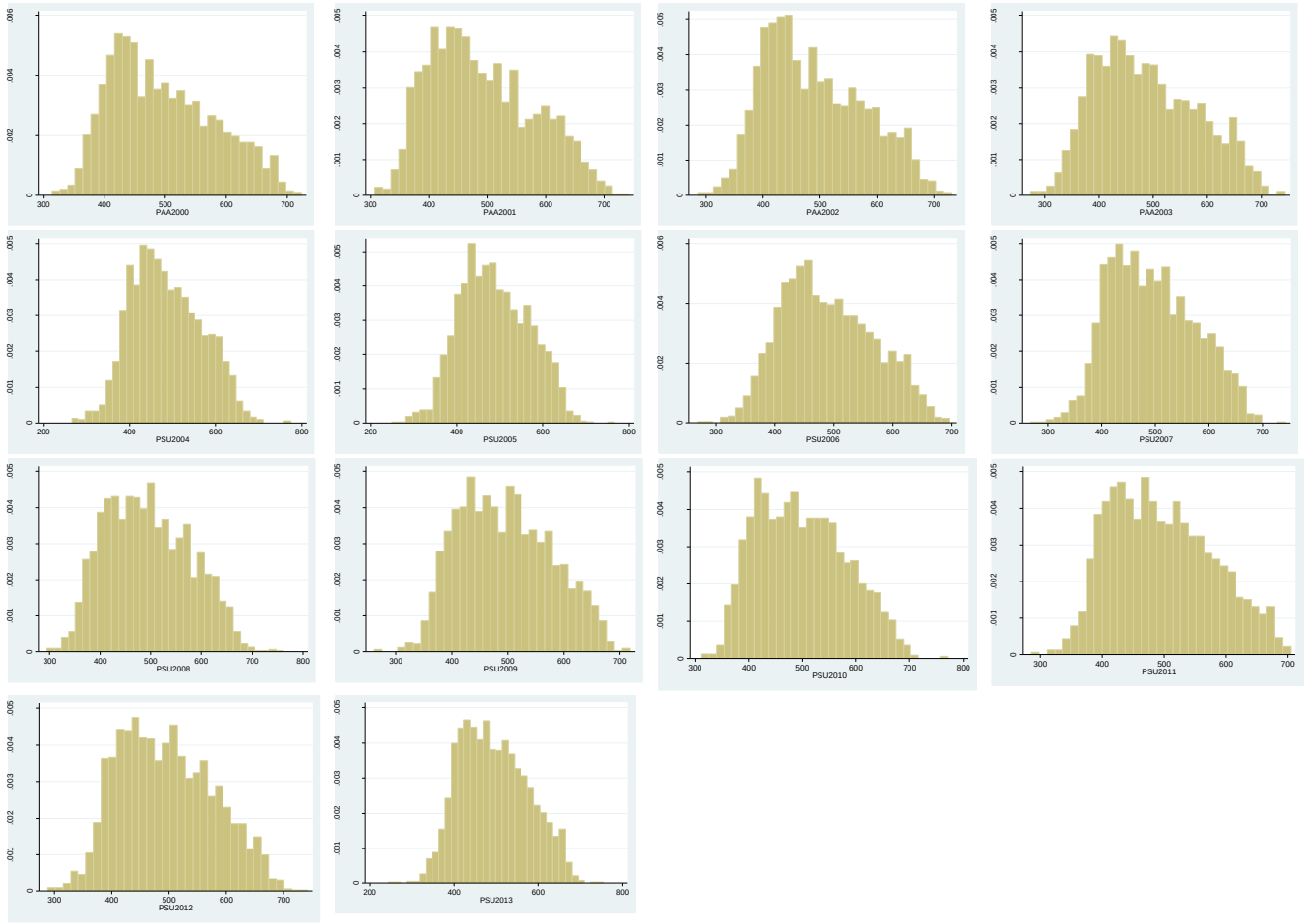
Time

2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
-3	-2	1	0	0	1	2	3	4	5	6	7	8	9

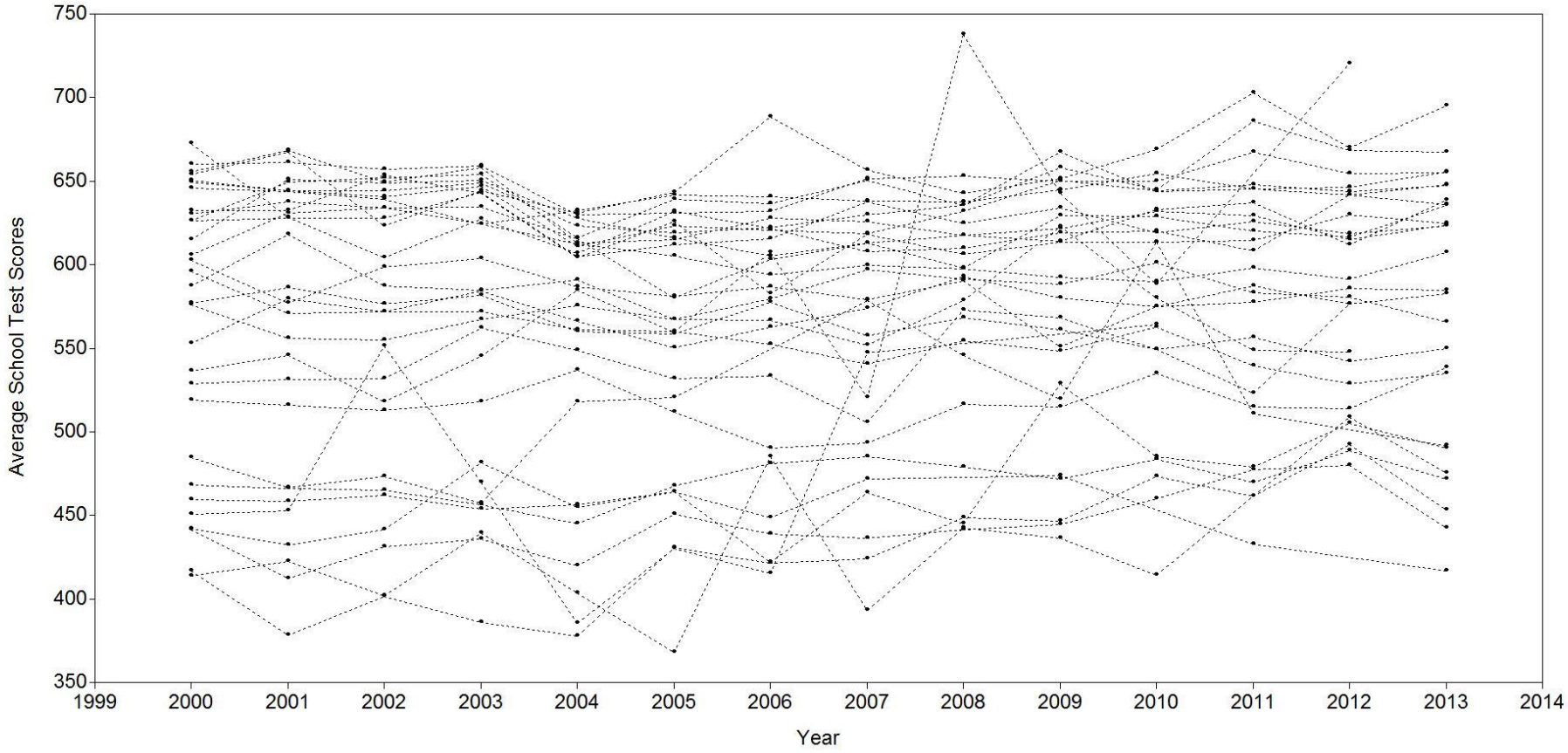
School sector

Private		Subsidized		Public		Total
903	28.5%	1,701	53.6%	569	17.9%	3,173

SCHOOL TEST SCORE MEANS



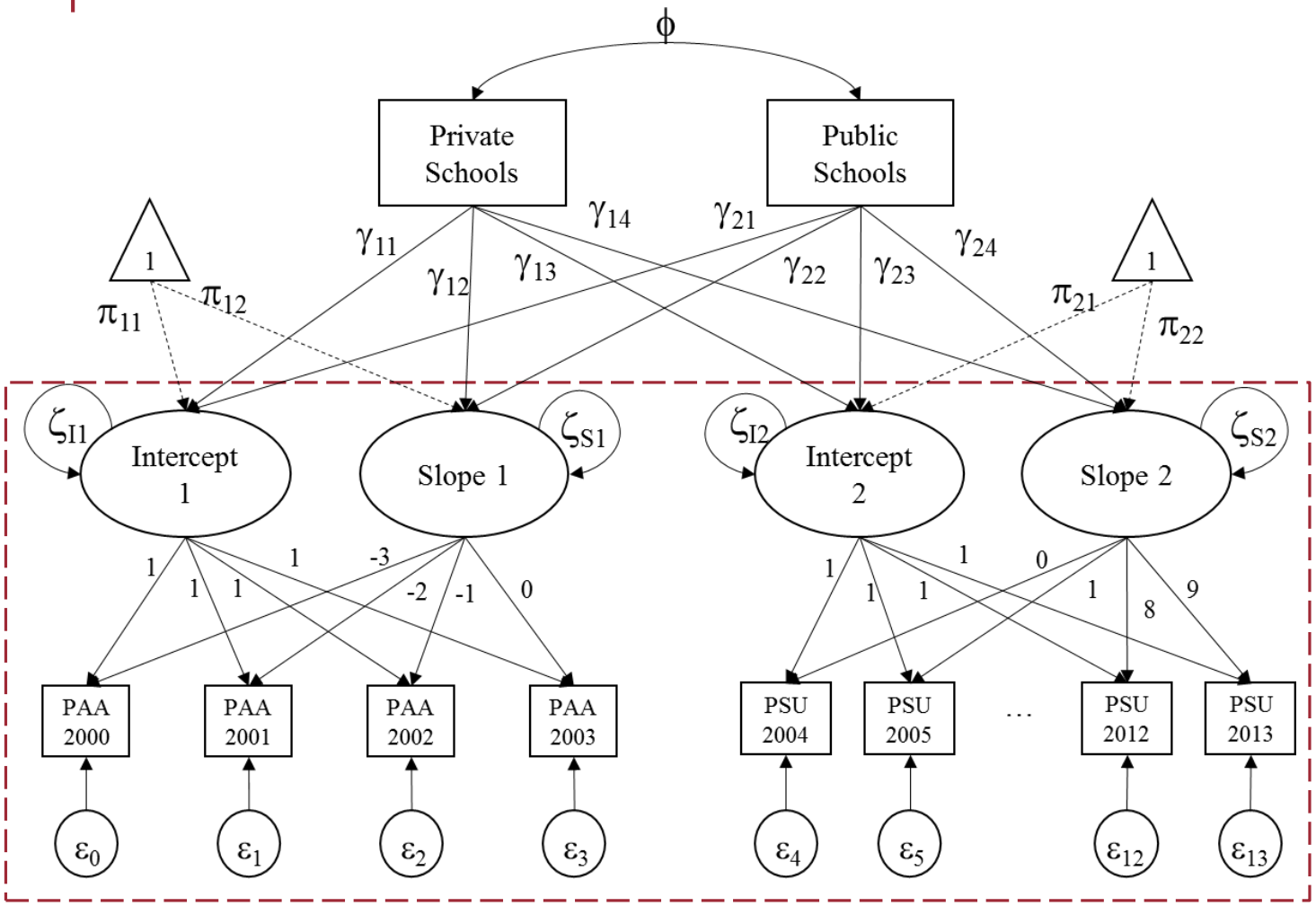
SAMPLE OF SCHOOL MEAN TEST SCORE TRAJECTORIES



MODELING APPROACH

- Discontinuous piecewise latent growth model
- Two periods of analysis: 2 intercepts and 2 slopes
- Appropriate for ***multi-phase data***, obtained before and after an intervention or transition point between phases (Kim & Kim, 2012)
- Mplus 7.4, MLR estimator

MODEL SPECIFICATION

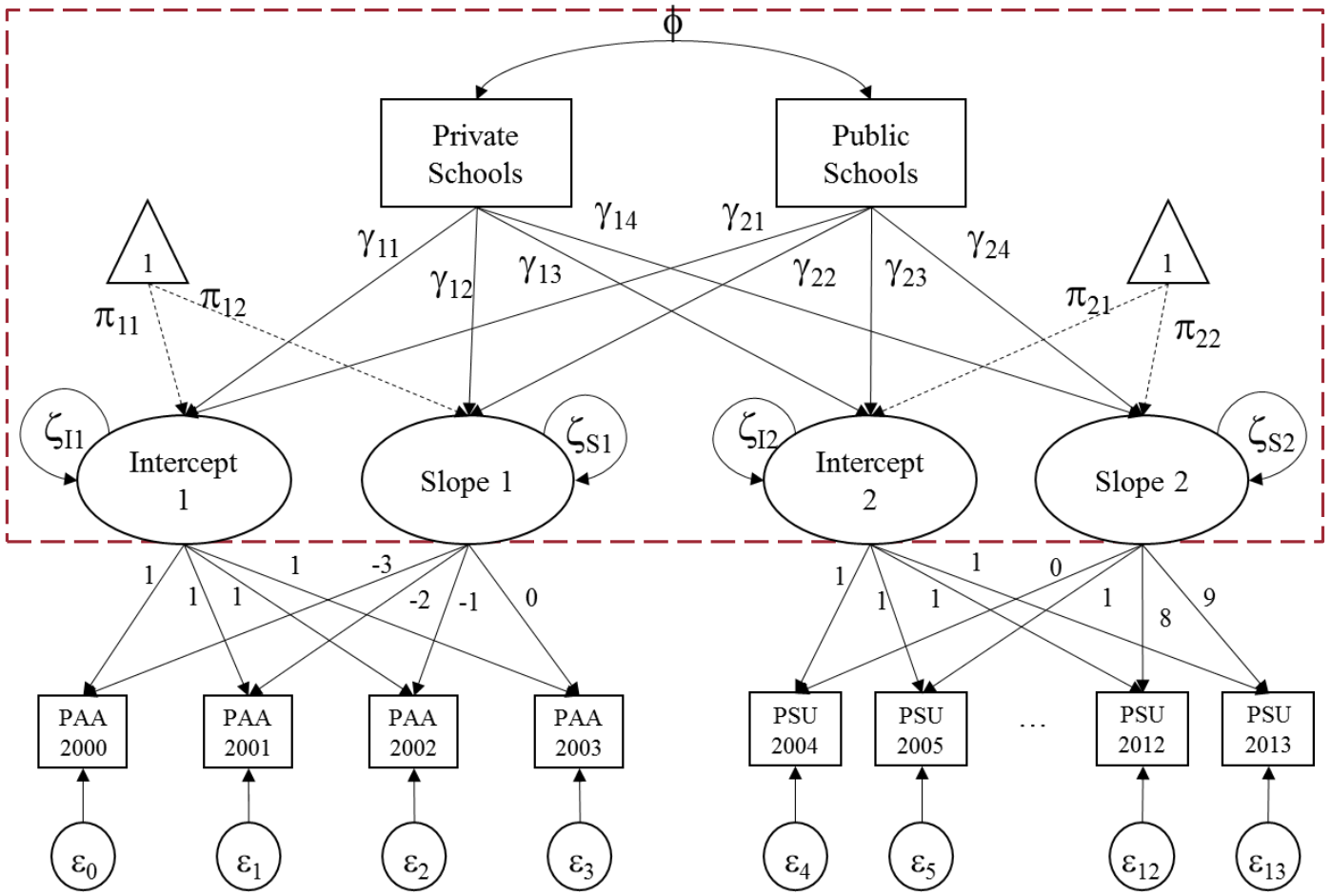


Measurement Model

$$PAA2000 = 1 * INTRCPT1 + -3 * SLOPE1 + \epsilon_0$$
$$PAA2001 = 1 * INTRCPT1 + -2 * SLOPE1 + \epsilon_1$$
$$PAA2002 = 1 * INTRCPT1 + -1 * SLOPE1 + \epsilon_2$$
$$PAA2003 = 1 * INTRCPT1 + 0 * SLOPE1 + \epsilon_3$$

$$PSU2004 = 1 * INTRCPT2 + 0 * SLOPE2 + \epsilon_4$$
$$PSU2005 = 1 * INTRCPT2 + 1 * SLOPE2 + \epsilon_5$$
$$PSU2006 = 1 * INTRCPT2 + 2 * SLOPE2 + \epsilon_6$$
$$PSU2007 = 1 * INTRCPT2 + 3 * SLOPE2 + \epsilon_7$$
$$PSU2008 = 1 * INTRCPT2 + 4 * SLOPE2 + \epsilon_8$$
$$PSU2009 = 1 * INTRCPT2 + 5 * SLOPE2 + \epsilon_9$$
$$PSU2010 = 1 * INTRCPT2 + 6 * SLOPE2 + \epsilon_{10}$$
$$PSU2011 = 1 * INTRCPT2 + 7 * SLOPE2 + \epsilon_{11}$$
$$PSU2012 = 1 * INTRCPT2 + 8 * SLOPE2 + \epsilon_{12}$$
$$PSU2013 = 1 * INTRCPT2 + 9 * SLOPE2 + \epsilon_{13}$$

MODEL SPECIFICATION



Structural Model

$$INTRCPT1 = \gamma_{11} \times PUBLIC + \gamma_{21} \times PRIVATE + \zeta_{i1}$$

$$SLOPE1 = \gamma_{12} \times PUBLIC + \gamma_{22} \times PRIVATE + \zeta_{s1}$$

$$INTRCPT2 = \gamma_{13} \times PUBLIC + \gamma_{23} \times PRIVATE + \zeta_{i2}$$

$$SLOPE2 = \gamma_{14} \times PUBLIC + \gamma_{24} \times PRIVATE + \zeta_{s2}$$

RESULTS

MODEL FIT

Fit Indices	Values
RMSEA	0.030
CFI	0.982
SRMR	0.035

R-SQUARE OF INDICATORS

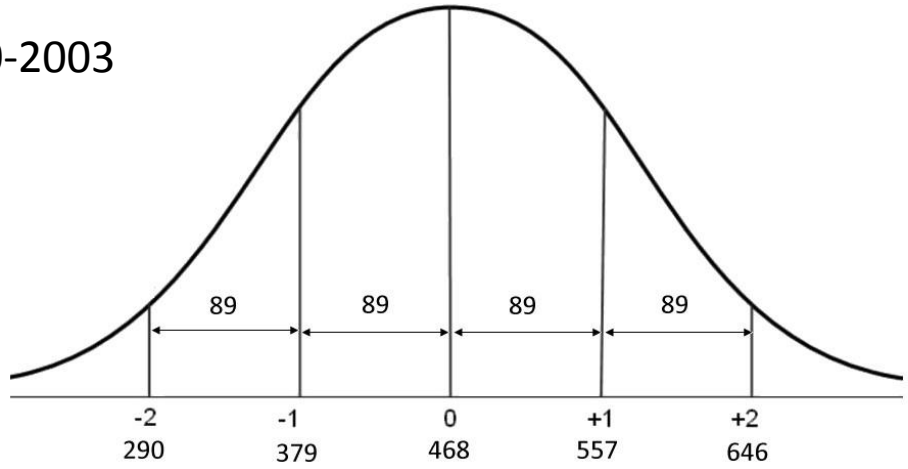
	Estimate	SE	p-value
PAA2000	0.963	0.008	0.0000
PAA2001	0.933	0.006	0.0000
PAA2002	0.927	0.007	0.0000
PAA2003	0.939	0.009	0.0000
PSU2004	0.897	0.009	0.0000
PSU2005	0.898	0.009	0.0000
PSU2006	0.905	0.007	0.0000
PSU2007	0.907	0.008	0.0000
PSU2008	0.909	0.008	0.0000
PSU2009	0.930	0.006	0.0000
PSU2010	0.931	0.006	0.0000
PSU2011	0.940	0.007	0.0000
PSU2012	0.938	0.007	0.0000
PSU2013	0.943	0.006	0.0000

ESTIMATED FACTOR PARAMETERS (ALL SCHOOLS)

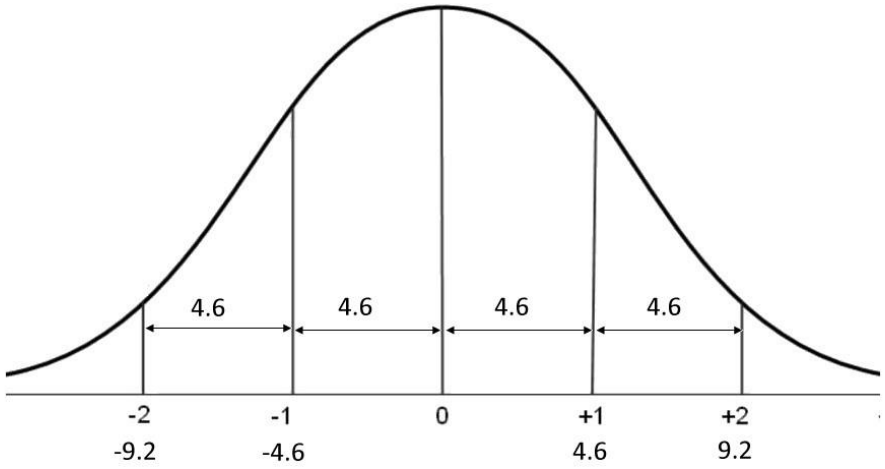
	Mean			Standard Deviation			Correlations			
	Estimate	SE	p-value	Estimate	SE	p-value	Intercept 1	Slope 1	Intercept 2	Slope 2
Intercept 1	467.740	26.522	0.0000	88.621	9.989	0.0000	1.000			
Slope 1	-0.331	6.939	0.2170	4.604	1.049	0.0000	0.558	1.000		
Intercept 2	472.492	17.386	0.0000	75.676	7.663	0.0000	0.986	0.524	1.000	
Slope 2	2.460	2.687	0.0000	3.093	0.782	0.0000	-0.012	0.017	-0.003	1.000

ESTIMATED FACTOR PARAMETERS (ALL SCHOOLS)

PAA 2000-2003

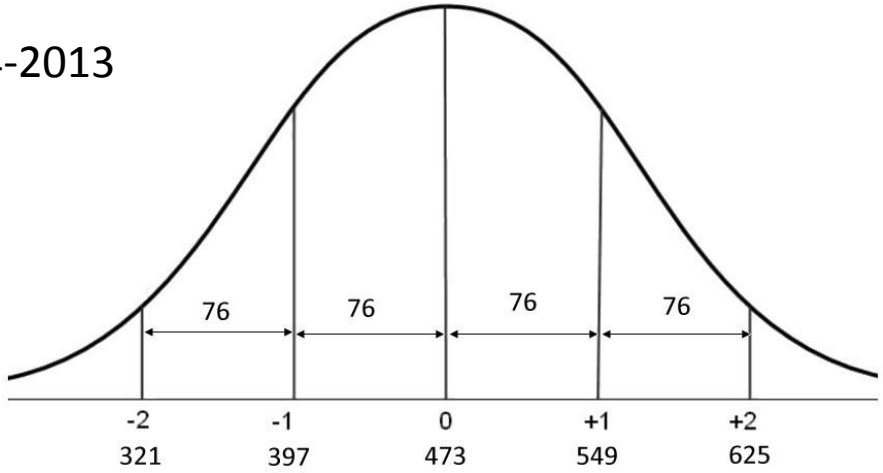


Intercept 1

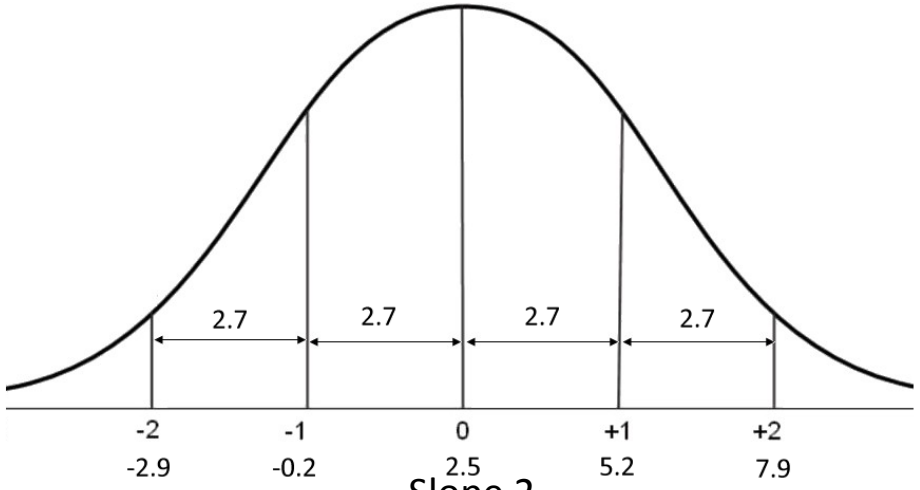


Slope 1

PSU 2004-2013



Intercept 2

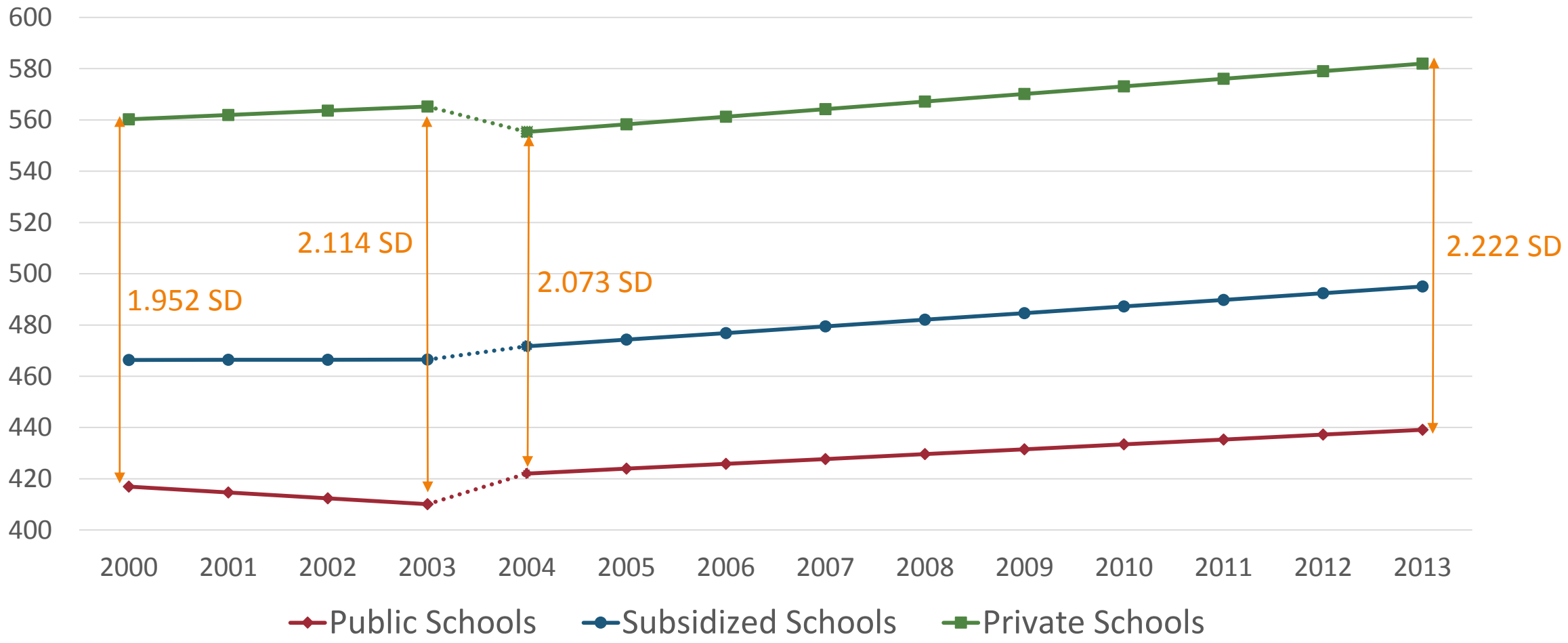


Slope 2

ESTIMATED FACTOR PARAMETERS BY SCHOOL SECTOR

	Means		
	Estimate	SE	p-value
Intercept 1			
Reference group (Subsidized schools)	466.517	2.343	0.0000
Public schools	-58.737	3.425	0.0000
Private schools	100.419	4.670	0.0000
Slope 1			
Reference group (Subsidized schools)	0.038	0.500	0.9400
Public schools	-2.322	0.678	0.0010
Private schools	1.638	0.796	0.0400
Intercept 2			
Reference group (Subsidized schools)	471.690	1.720	0.0000
Public schools	-49.664	2.607	0.0000
Private schools	83.606	3.720	0.0000
Slope 2			
Reference group (Subsidized schools)	2.589	0.150	0.0000
Public schools	-0.690	0.250	0.0060
Private schools	0.379	0.261	0.1470

TEST SCORE GAP BY SCHOOL SECTOR



DISCUSSION

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- On average, school trajectories were very flat before the test overhaul, while afterwards, they have been growing 2.5 score points a year.
- However, public schools have negative slopes, an public schools positive slopes in both periods.
- On average, test score gaps exceed 2 standard deviations among private and public schools, even after the test revamp.
- The test overhauled prevented the gap among private and public schools to keep growing, but only marginally.

IMPLICATIONS

- Efforts to improve educational measurement instruments would only result in a more precise assessment of students outcomes; but it cannot be expected it will result in decreased achievement gaps.
- Given the persistent gaps among school sectors, test-based admissions to college does not provide equitable opportunities of access to higher education for students of different school sectors.

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THANK YOU!