Teacher Testing Standards and the New Teacher Pipeline

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Motivation

Testing is widely used as an entry screen by firms, universities, and governments

- e.g., SAT/GRE for admissions to US universities
- e.g., occupational licensing exams

Surprisingly little empirical evidence of the impact of testing standards.

- Data limitations. Passing scores not available in many settings.
- **Standards can be adjusted endogenously to market conditions** (Pagliero 2013).

We have a natural experiment that allows us to investigate the impact of testing standards on the supply of new public school teachers in the United States (≈2.5 percent of labor force).

→**Entry testing standards for teacher prep programs were *simultaneously* raised in many states and lowered in others.**

Related literature

- **Impact of occupational licensing**: e.g. Kleiner 2006, 2013; Kleiner and Krueger 2010; Gittelman et al 2018; Law and Kim 2005; Law and Marks 2009, 2017; Thornton and Timmons etc. 2013.

  Generally does not focus on test requirements.
- **Impact of teacher exit tests**: e.g., Clotfelter et al 2010; Goldhaber 2007; Goldhaber and Hansen 2010; Chen et al 2023.

  Focus is primarily on student achievement.
- **Impact of teacher entry tests**: e.g. Angrist and Guryan 2008; Larsen et al 2020.

  Focus is on teacher wages and teacher input quality.

Institutional background

In the US, states require teachers to be licensed to teach in public schools.

- Licensing requirements set at the **state level**.

  Requirements include standards for entry into teacher preparation programs, course work, student teaching hours, exit exams on subject matter and pedagogy.

- Typically, prospective teachers enroll in a state-recognized **teacher training program** within university education schools.

Testing occurs at various points along the pipeline.

- A subset of states require prospective teachers to take general knowledge entry tests, usually taken in 2nd or 3rd year of undergraduate studies, to enter their university's teacher prep program.
- Many states outsource this exam to the Educational Testing Service (ETS).

PPST and Praxis Entrance Exams

Prior to 2013, this entry test was the Pre-Professional Skills Test (PPST).

- PPST had three test components: reading, writing, math
- Passing scores for each component set by states. Prospective teachers must obtain minimum score on each test component.

Between March 2013 and Sept 2014, PPST gradually phased out and replaced with Praxis Core.

- Core still consists of three components (reading, writing, math). Overall content similar to PPST.

  Key difference: PPST scored from 150-190 while Core scored from 100-200.

- ETS convened a multi-state panel to determine recommended passing scores. Among 22 states plus DC that used PPST, every state but one adopted the scores recommended by the panel.

Testing standards: how to measure the stringency of testing standards

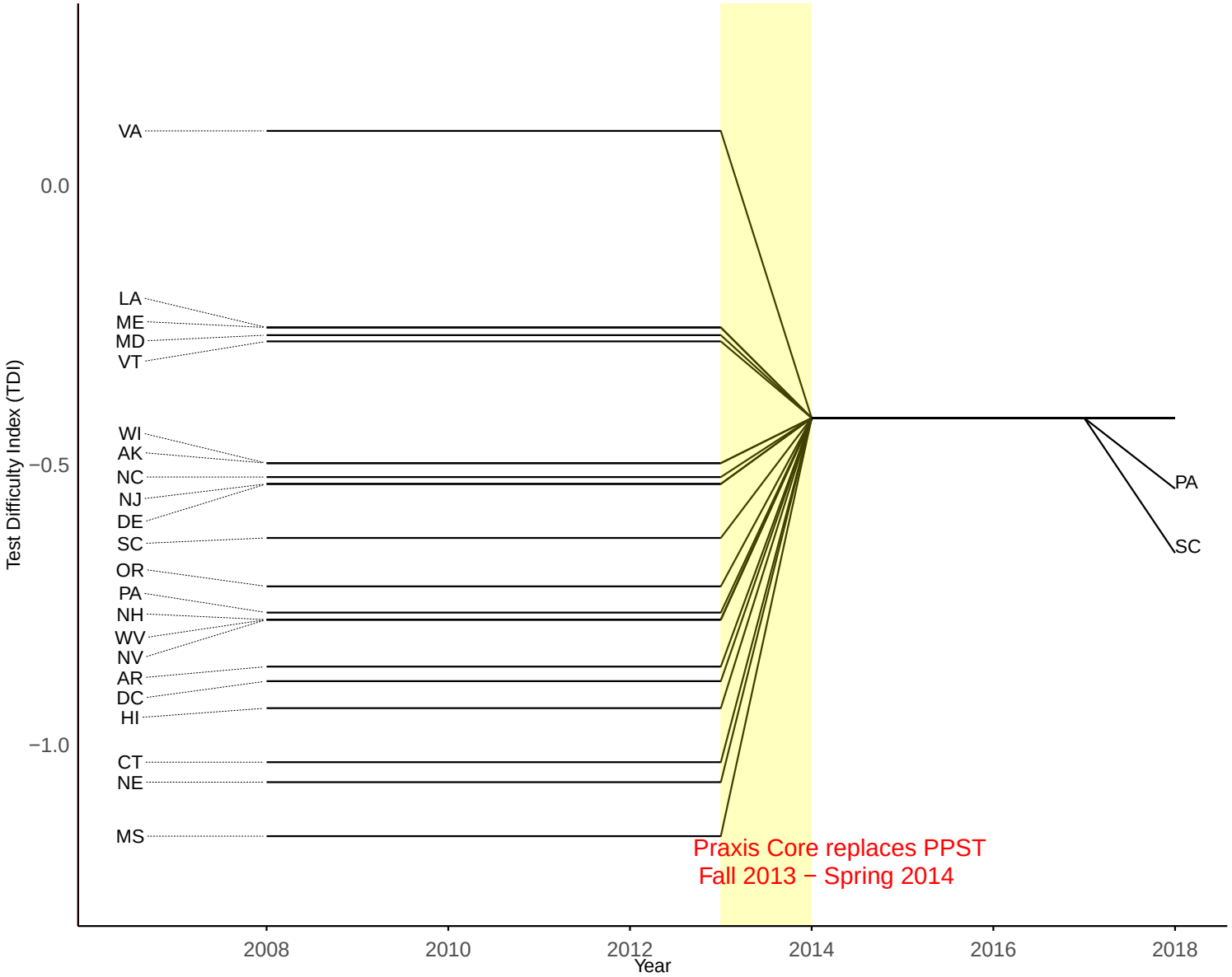
When PPST replaced by Core, min and max scores altered. Can't compare old and new raw minimum passing scores.

> **Solution**: Standardize raw min passing scores for each state for each test component (reading, writing, math) into z-scores using means and s.d for national sample of PPST and Core takers

How to convert three components into a single Test Difficulty Index (TDI)

> **Solution**: Use arithmetic mean of standardized min passing score for each component.
>
> **Variable of interest**: Change of test difficulty arising from replacement of PPST with Core.

Test Difficulty Index (TDI)



Data

Minimum passing scores at state-year level.

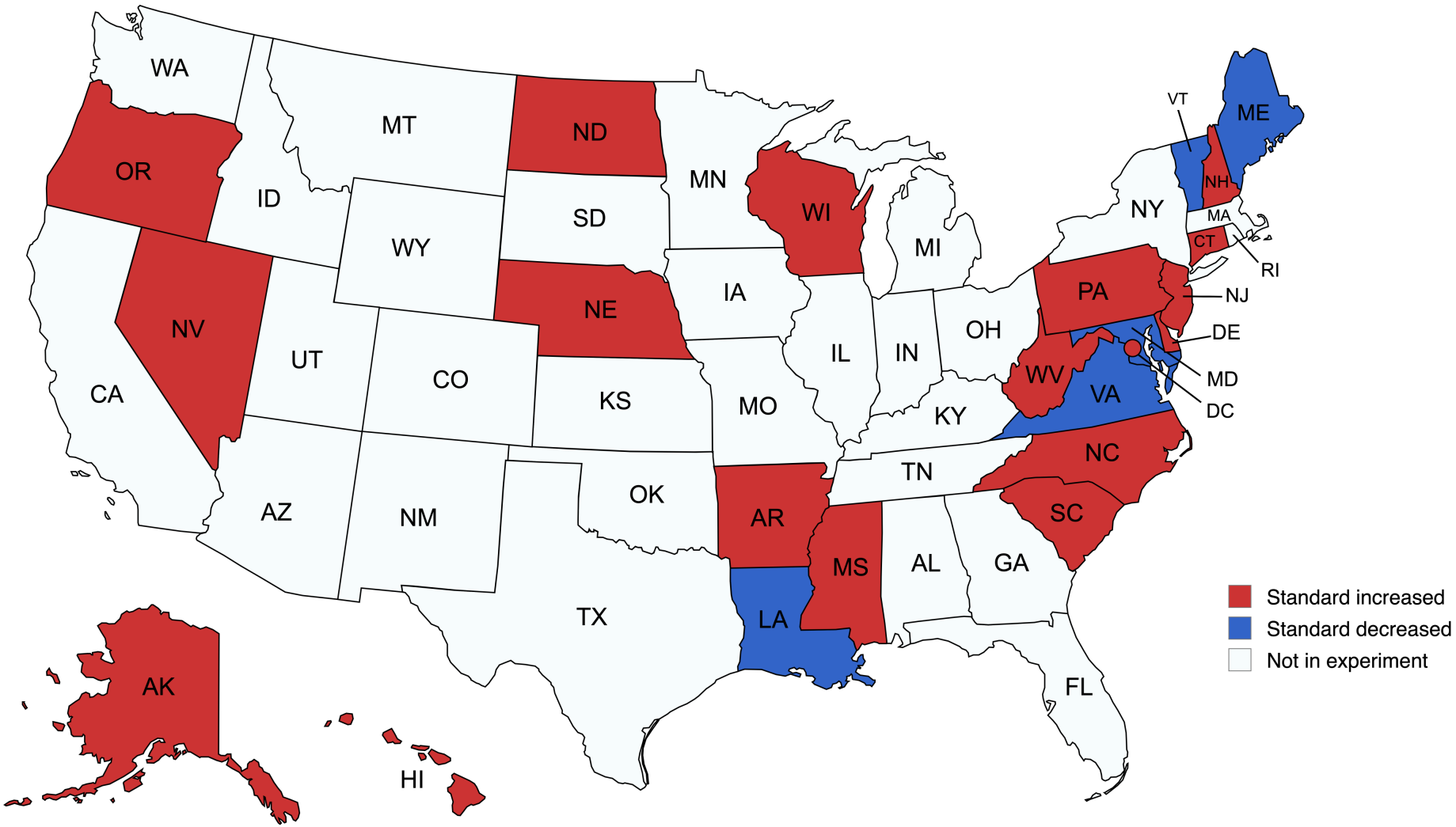
- From ETS cross-checked with state departments of education.
- State must use PPST from 2008-12 and adopt Praxis Core using recommended minimum passing scores. $\rightarrow$**21 states plus DC**.

Enrollment and graduations from teacher prep programs

- From Integrated Postsecondary Education Data System (IPEDS): university-level data on fall enrollment in education majors (biennial) and graduations from teacher prep programs (annual).
- Enrollment at 2-digit CIP level. Graduation at 6-digit CIP level (using categorization of Kraft et al 2020).

  $\rightarrow$**507 institutions**.

States that used PPST and adopted Praxis Core with recommended minimium passing scores



Two-way Fixed Effects Specification

$$Y_{u,s,t} = \beta_1 TDI_{s,t} + \alpha_{u,s} + T_t + \gamma V_{s,t} + \theta Z_{u,s,t} + u_{s,t} \quad (1)$$

- $Y_{u,s,t}$ equals log of fall enrollment in the education program or graduations from the teacher preparation program.
- $TDI_{s,t}$ the value of the test difficulty index in state s in year t
- $\alpha_{u,s}$ a set of university fixed effects
- T_t a set of year fixed effects
- $Z_{u,s,t}$ a vector of time-varying university-level controls variables
- $V_{s,t}$ a vector of state level economic and education policy control variables.

Results: Education Major Enrollments

Table: Education Major Enrollments

	All Universities and States	Non-Selective Universities	Selective Universities	Shrinking State	Growing State
TDI	-0.23**	-0.57**	0.00	-0.09	-0.26*
	(0.07)	(0.16)	(0.10)	(0.22)	(0.10)
Observations	2,896	1,313	1,583	1,567	1,329
Mean enrollment	566	387	691	548	596

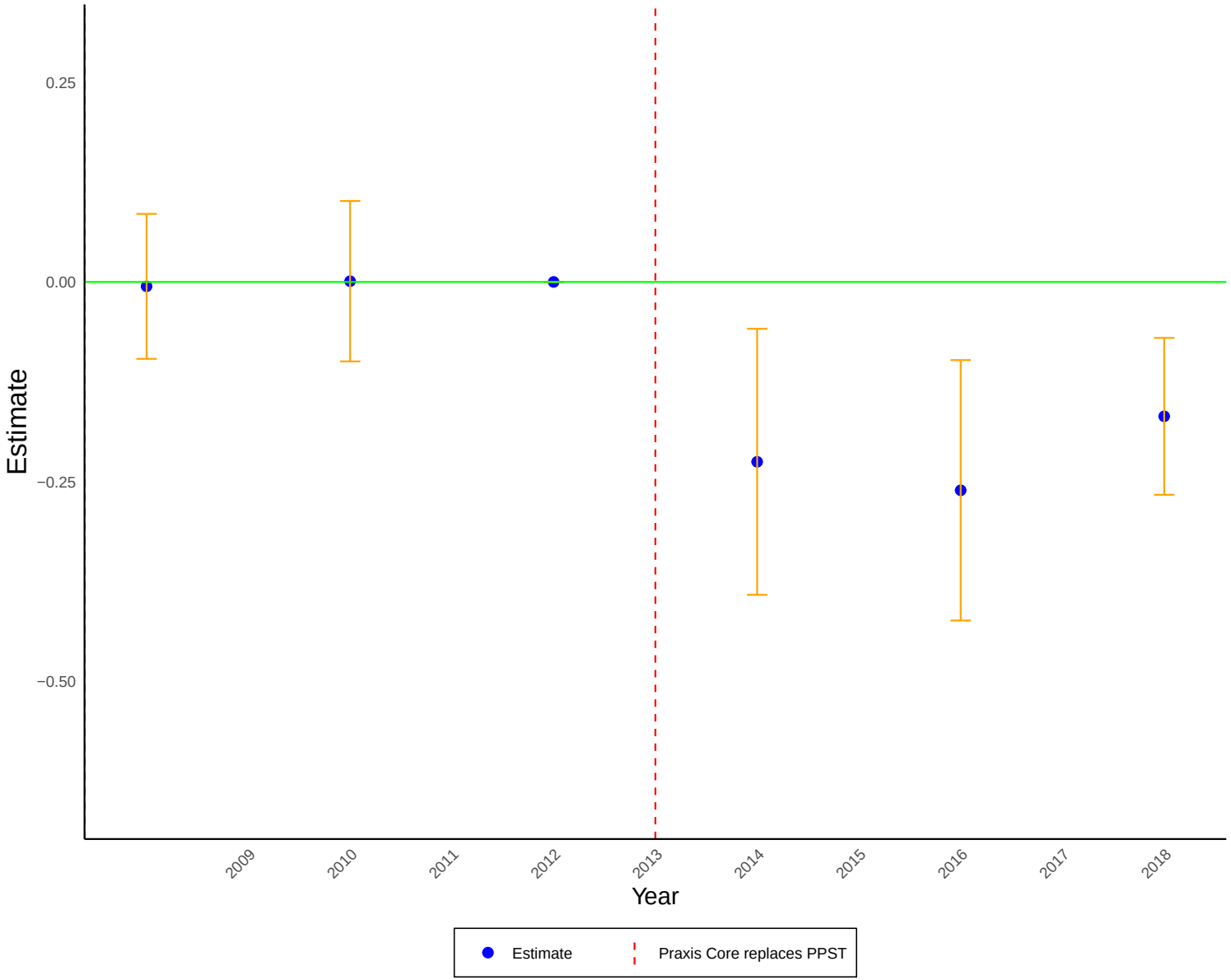
- A one standard deviation increase in the test difficulty index causes a 23 percent decrease in enrollments in education majors.

Enrollments: Event Study

$$Y_{u,s,t} = \alpha_{u,s} + T_t + \sum_{k=-2}^{k=3} \delta_k \Delta TDI_{s,t-k} + \gamma V_{s,t} + \theta Z_{u,s,t} + u_{s,t} \qquad (2)$$

- ΔTDI is equal to the TDI in 2014 (the first year of full adoption of the Core) minus TDI in 2012 (when the PPST was the only entrance exam).
- Since our enrollment data is biannual, in equation (2) we trace out the anticipatory effects for years 2008 and 2010 as well as the dynamic post treatment effects for years 2014, 2016, and 2018.
- The year 2012 is standardized to zero. All other variables are defined as in Equation (1).

Enrollments: Event Study



Results: Teacher Preparation Program Graduations

Table: Teacher Preperation Program Graduations

	All Universities and States	Non-Selective Universities	Selective Universities	Shrinking State	Growing State
TDI	-0.23**	-0.48*	-0.10	-0.16*	-0.16
	(0.07)	(0.19)	(0.05)	(0.06)	(0.09)
Observations	5,780	2,629	3,151	3,130	2,650
Mean graduates	124	72	161	121	128

- A one standard deviation increase in the test difficulty index causes a 23 percent decrease in graduations from teacher preparation programs.

Results: Graduations

- This change in pass score difficulty was not efficient!
    - Students interested in completing the teacher preparation program and whom the university would have passed are being screened out.
- Back-of-the-envelopment calculation suggest replacement of PPST with Praxis Core accounts for almost 19 percent of decline in graduates from teacher preparation programs between 2012 and 2020.
- Among the four states (HI, CT, NE, MS) in which standards increased the most, average change in test difficulty was 0.64 s.d., implying a reduction in teacher prep graduations of 15 percent (0.64×0.23). Graduations fell by 26 percent in these four states.

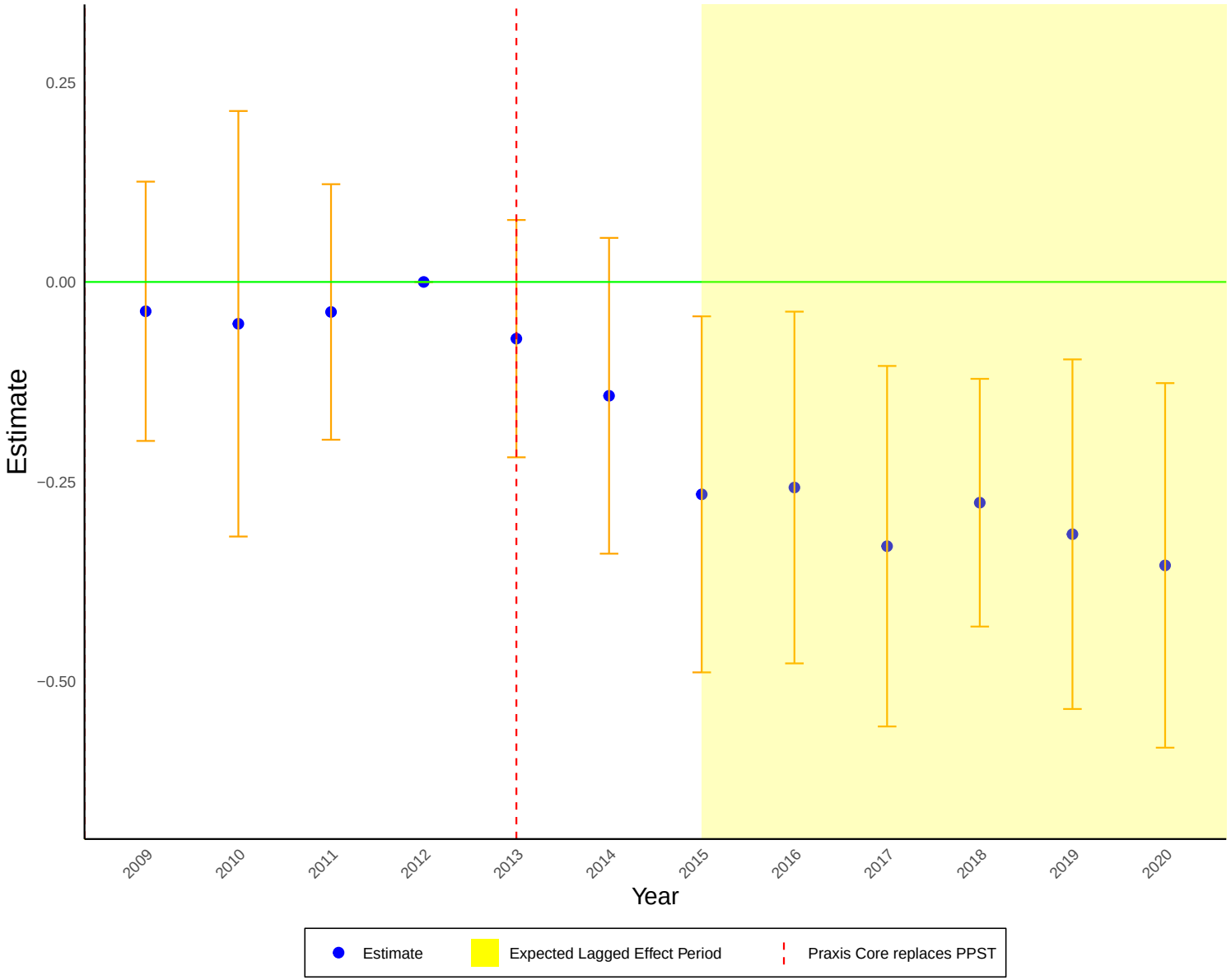
$\rightarrow$In these four states 58 percent ($=0.15 \div 0.26$) of decline in graduations due to replacement of PPST with Core.

Graduations: Event Study

$$Y_{u,s,t} = \alpha_{u,s} + T_t + \sum_{l=-3}^{l=7} \delta_l \Delta TDI_{s,t-l} + \gamma V_{s,t} + \theta Z_{u,s,t} + \epsilon_{s,t} \quad (3)$$

- Estimate the impact of the policy change on the size of the graduation cohorts for the years 2009-2012 when the changes to the entry exam **could** not have influenced the number of graduates.
- 2013 and 2014 when the changes to the entry exam should not have influenced the number of graduates.
- Expect the effect of the change in testing standards to grow as all new entrants into teaching preparation programs are held to the new standard.

Graduations: Event Study



Falsification tests

Are changes in testing standards correlated with broader changes in college enrollment and graduations? Look at impact of change in testing difficulty on enrollments and graduations of students who are not required to take test.

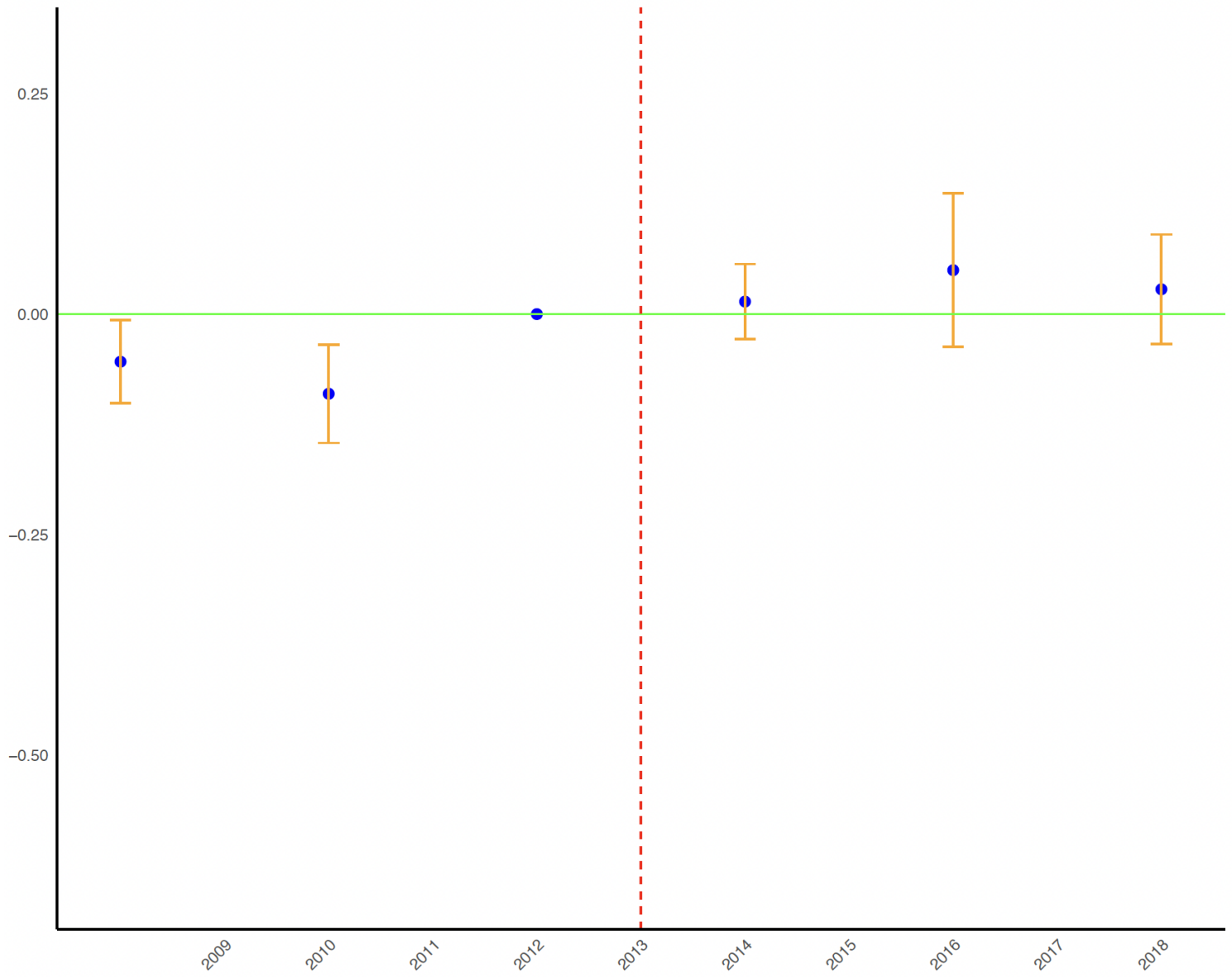
1. Enrollments of all students except education majors.

   There may be a small substitution towards other majors.

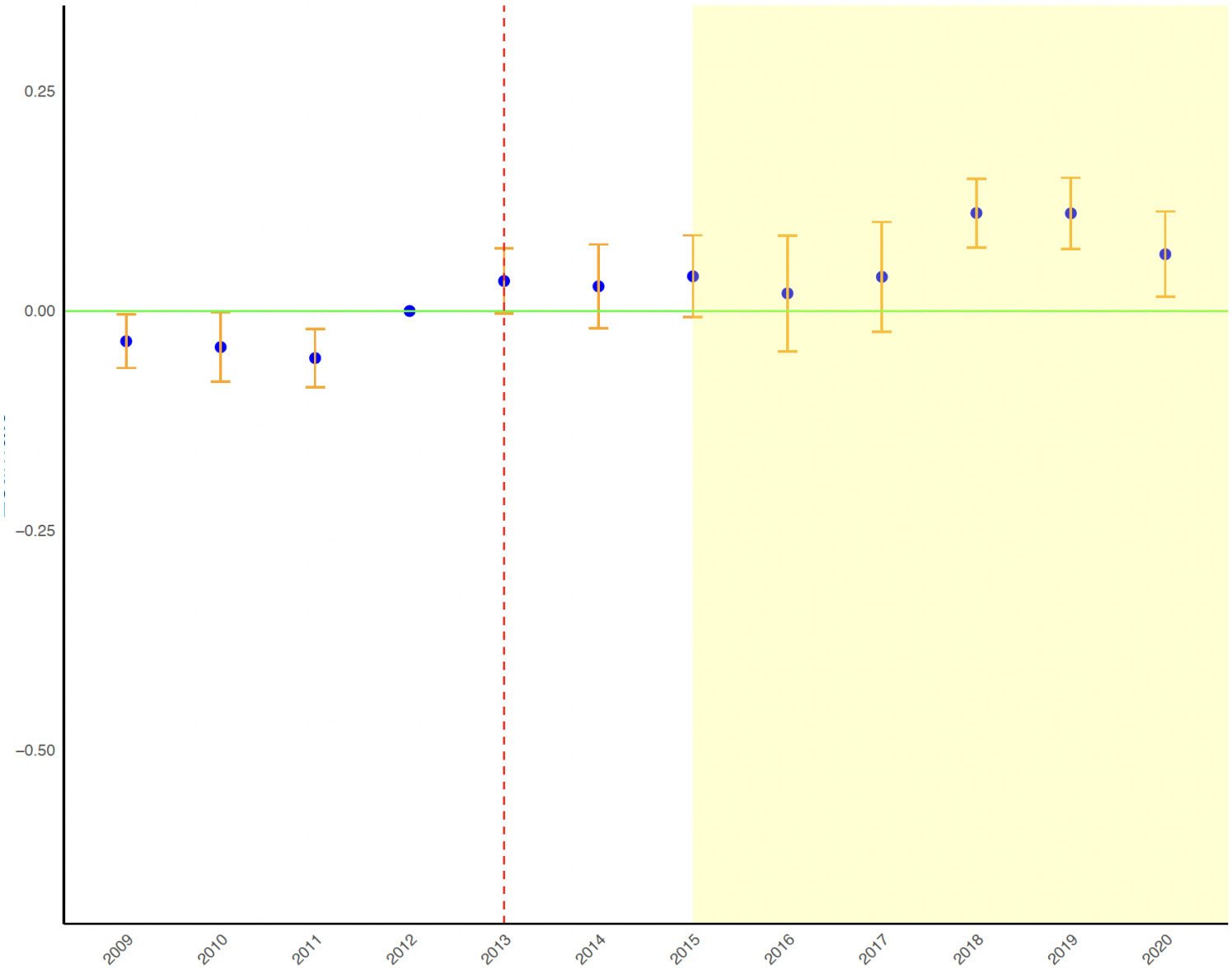
2. Graduations of all students who are not in teacher preparation programs

3. Graduations of education majors who are not in teacher preparation programs. (This includes guidance counselors, administrators, education media, etc.)

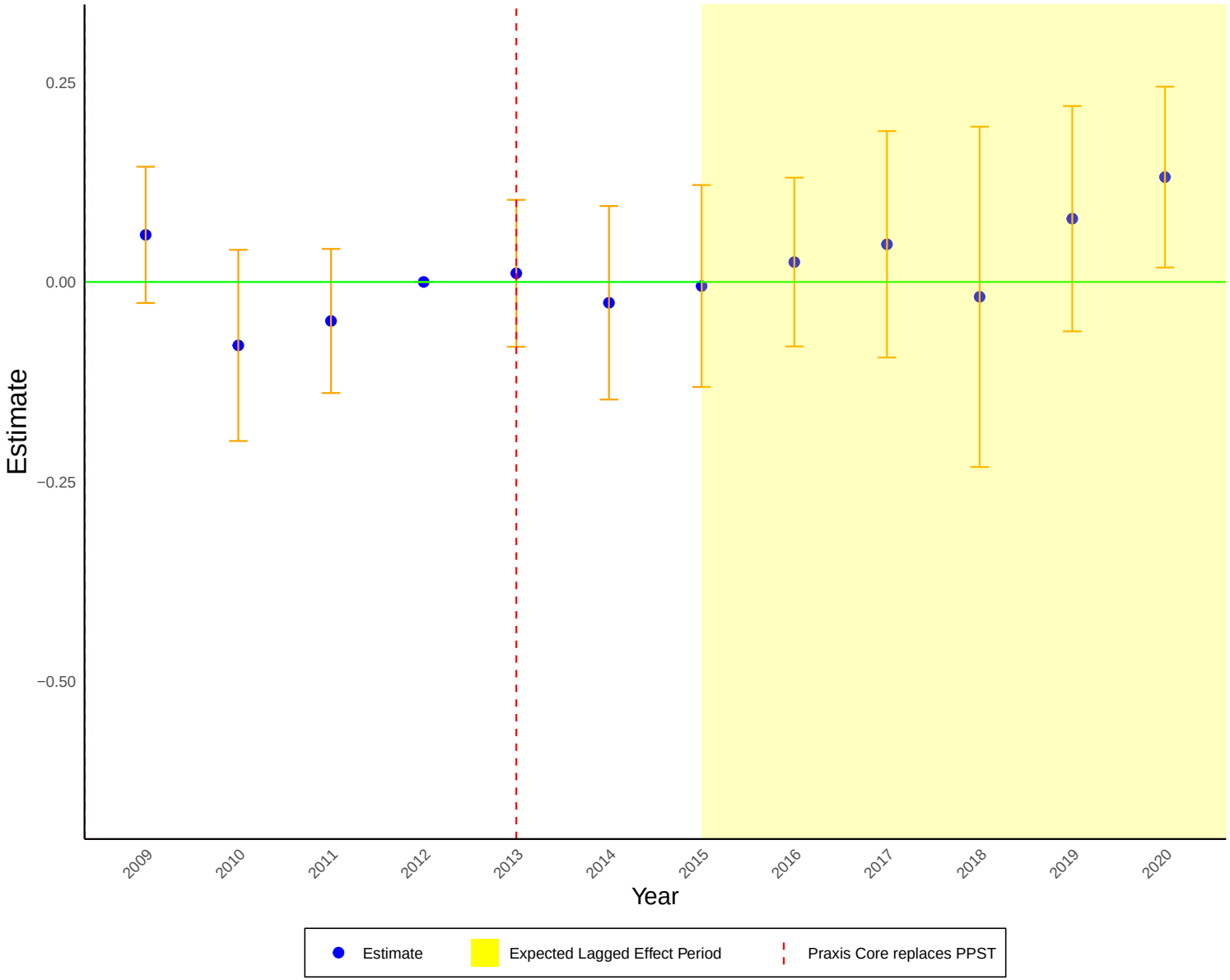
Placebo: Non-education major enrollments



Placebo: Non-education major graduations



Placebo: Other Education Graduations



Conclusion

Increases in licensing test difficulty have economically large impacts on the new teacher pipeline.

- Replacement of PPST with Praxis Core simultaneously lowered testing standards in five states and raised them in 18 other states.
- Increase in test difficulty of one s.d. reduced education major enrollments and teacher prep program graduations by 23 percent.
- Effects concentrated among academically weaker institutions.
- Change in testing standards also correlated with a decline in the number of new teacher licenses awarded at the state-year level.
- Teacher preparation program entrance exams are an under-discussed factor behind the teacher shortage.