The Consequences of High School Exit Examinations for Students' Educational Attainments

Background:

Many states have implemented exit examinations that students must pass in order to earn high school diplomas. Advocates argue that such examinations create incentives for students to learn important cognitive skills. By certifying that high school graduates have mastered academic content standards, the examinations may increase the economic value of a high school diploma (Evers & Walberg, 2002). Opponents of these tests suggest that they put unnecessary stress on students and encourage them to drop out of high school (Thomas, 2005). They also argue that such tests place the greatest burden on vulnerable subgroups of students (Kornhaber & Orfield, 2001).

The effects of high-stakes testing on life outcomes are important for educational policymakers to understand. We focus on one necessary feature of these tests – that similarly-performing students on either side of the pass/fail cutoff are treated differently. Research on this topic has yielded mixed results. Reardon et al. (2010) found no statistically significant effects on high-school graduation rates in California. Others have found that barely failing an exit exam reduced the probability of on-time graduation and college enrollment for students in other states (Ou, 2010; Papay, Murnane & Willett, 2010 & 2014). Here, we focus on the impacts of barely failing these exit exams on graduation from high school and from four-year colleges and universities.

Purpose:

We estimate the impact of passing the 10th grade mathematics exit examination – as opposed to failing it – for students of essentially equal ability near the pass/fail cutoff. We pay particular attention to heterogeneous effects for students by family income.

RQ1. *Does passing the high school mathematics exit examination as a 10th grader make students on the margin of passing more likely to graduate from high school or from a four-year college?*

RQ2. *How does just passing the exit examination impact college enrollment and persistence?*

Setting:

In many ways, Massachusetts may provide a "best case" test of the impact of exit exams because its curricular standards were strong (Achieve, 2001, 2007), and the state put substantial new resources into education. The average NAEP scores of Massachusetts students have risen markedly over the last two decades. Thus, we examine the exit-exam policy in a system that has brought about significant accomplishments.

Population:

The Massachusetts public school system serves nearly 1 million students annually. We focus on the approximately 350,000 students who first took the 10th grade MCAS as sophomores in 2003-07 and for whom it was a high-stakes test. Table 1 includes outcome means and demographics for these students and for the subsample who scored within two raw-score points of the passing cutoff on the math test. About 60% of these test-takers were economically disadvantaged, 30% had Individual Education Plans, and 7% were English learners.

Intervention:

Beginning with the class of 2003, the 10th grade MCAS math and English Language Arts (ELA) assessments have functioned as high school exit exams. Students must pass both tests in order to receive a high school diploma. The state allows students to take the tests without time constraints and to retake it repeatedly if they fail.

Research Design:

By examining students immediately on either side of each cut score on the forcing variable (in this example, the 10th grade mathematics exam, $MATH_i$), we compare the population probability of graduating from college within seven years of taking the test ($COLL_i$) for two groups of students – those who scored at the cut score and passed and those (hypothetical) students who scored at the cut score yet failed:

$$\gamma_{above} = \lim_{MATH_i \to 0^+} \left[P(COLL_i = 1) \mid MATH_i\right] \text{ and } \gamma_{below} = \lim_{MATH_i \to 0^-} \left[P(COLL_i = 1) \mid MATH_i\right]$$

If the cut score is established exogenously, then students just on either side of the cut score must be equal in expectation, and the estimated difference between these parameters provides an unbiased estimate of the causal impact of the classification for students at the cut score, in the population (Lee & Lemieux 2010). Because the classifications are applied rigidly, our discontinuity is sharp.

We estimate this difference using a local linear probability model:

(1) $$p(COLL_i = 1) = \beta_0 + \beta_1 MATH_i + \beta_2 ABOVE_i + \beta_3 (ABOVE_i \times MATH_i) + \varepsilon_i$$

for student *i*. In this model, β_2 represents the causal effect of interest. If its estimated value is statistically significant and positive, we can conclude that just passing the exam causes the student's probability of graduating from college to *increase* discontinuously, on average, in the population.

We explore heterogeneous treatment effects by interacting key demographic moderators with our treatment predictors of interest.

Data

We integrate two main datasets. The first tracks Massachusetts public-school students throughout their K-12 careers and includes MCAS results and demographic characteristics. The second includes National Student Clearinghouse records that track post-secondary educational attainments. For supplementary analyses, we use records from the state's Department of Higher Education that includes course-taking information for in-state public colleges and universities.

Findings & Conclusions:

Consistent with our prior work, we find a positive impact of just passing the math exam on the probability of high-school graduation. The effect is about two percentage points in the full sample of test-takers who scored within three points of the passing threshold, the optimal bandwidth for this outcome. However, as the results in the second column of Table 2 make clear, the subgroup of low-income students is driving this effect. As in Papay, Murnane & Willett (2010), there appears to be no difference in the high-school graduation rates of higher-income students on either side of the passing threshold.

With additional cohorts of test-takers and the passage of more time, we are now able to estimate impacts on four-year college graduation. As shown in the final column of Table 2, students who just pass the math exam are about a percentage point more likely to graduate from

a four-year college. However, in contrast to the impact on high-school graduation, this effect is concentrated in the subgroup of *higher*-income students. Among students from more advantaged families, just passing the math exit exam causes a 2.2 percentage point increase in the probability of college graduation. Given that the graduation rate among these higher-income students near the cutoff is only about 10%, this is a substantial effect, one that is robust to bandwidth selection.

We also examine the first college enrollments of students within four years of taking the MCAS. While positive, statistically significant impacts exist on enrollment in any college for all groups, only higher-income students are more likely to enroll in a *four*-year college after just passing the math exam.

We find convincing evidence that students with essentially the same proficiency on the state test have substantially different high school and college outcomes simply because they are categorized as "passing" or "failing" the examination. These effects represent unanticipated consequences of efforts to raise standards and prepare students for college and career success. These consequences need to be at the center of efforts to make standards-based reforms work for all students in the years ahead.

References

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Table 1. *Sample proportions of all first-time tenth-grade test-takers and those within two raw-score points of the passing threshold on the 10th grade mathematics exit examination for key outcomes and demographic indicators*

	All students	**Students within 2 raw-score points of the passing cutoff**		
	n=348,306	All n=25,331	Low-Income n=14,524	Higher-Income n=10,807
Outcomes				
Graduated high school (MCAS+3)	0.86	0.75	0.70	0.80
Enrolled in any college (MCAS+4)	0.68	0.43	0.38	0.50
Enrolled first in 2-year college (MCAS+4)	0.20	0.30	0.28	0.33
Enrolled first in 4-year college (MCAS+4)	0.48	0.13	0.10	0.17
Graduated from 2-yr college (MCAS+7)	0.05	0.05	0.04	0.07
Graduated from 4-yr college (MCAS+7)	0.34	0.06	0.04	0.09
Demographics				
Asian	0.05	0.03	0.04	0.01
African-American	0.08	0.16	0.23	0.06
Hispanic	0.10	0.19	0.30	0.04
White	0.76	0.62	0.42	0.88
English Language Learner	0.04	0.07	0.12	0.01
Students with disabilities	0.14	0.29	0.25	0.33
Female	0.50	0.51	0.52	0.49
Urban	0.27	0.41	0.58	0.19
Low-income	0.34	0.57	1.00	0.00

Notes. MCAS is the Massachusetts Comprehensive Assessment System 10th-grade mathematics test; (MCAS+3) indicates that the outcome was measured three years after students took the test.

Table 2. Estimated causal effects of passing the 10th grade exit examination in mathematics, as opposed to failing it, on the probability of selected high-school and college outcomes for students at the margin of passing, for all students and by family income.

Group	High-school graduation (MCAS+3) h*=3	Any college enrollment (MCAS+4) h*=2	Four-year college enrollment (MCAS+4) h*=2	Four-year college graduation (MCAS+7) h*=2
All students	0.018**	0.021*	0.018**	0.007**
	(0.003)	(0.0003)	(0.001)	(0.0002)
Low-income students	0.030**	0.027**	0.001	-0.004
	(0.006)	(0.006)	(0.001)	(0.002)
Higher-income students	0.001	0.021*	0.043**	0.022**
	(0.002)	(0.008)	(0.004)	(0.003)
N	35,467	25,331	25,331	25,331

** $p<0.01$, * $p<0.05$, + $p<0.1$

Note. Standard errors clustered on raw score point are in parentheses. Column headings include outcomes, the number of years after taking the MCAS exit examination in which each outcome is measured, and the optimal bandwidth resulting from the cross-validation procedure referenced in the text.