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ACT Testing Policy in Tennessee: Effects on Test-Taking, Scores, and College Enrollment

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Abstract

College entrance exams (i.e., ACT and SAT) are widely used for both merit-based financial aid and college admissions, and higher-income students are more likely to take these exams than their lower-income peers. In response, several states have implemented universal college entrance exams in which all high school juniors sit for the test on a school day. While these policies have been effective at increasing access to the exams for low-income students, higher-income students still retake the exams at higher rates than low-income students do, allowing exam-related gaps in postsecondary access to persist. In 2016, Tennessee became the first universal exam state to expand the policy to include a free universal retake for all students in fall of senior year. Using longitudinal state administrative data, this study explores the impact of this Tennessee policy on retake rates, ACT scores, and postsecondary enrollment. This study bridges the literature on universal entrance exam policies with the literature on exam retakes by evaluating the first universal exam policy to include a free retake opportunity. Results indicate that the policy has substantially increased retaking rates and narrowed income-based gaps in access to the exams. However, the policy has done little to improve overall ACT scores, and therefore, has likely not impacted trends in college enrollment by way of higher ACT scores.

Introduction

Economically disadvantaged students face more barriers in their pursuit of postsecondary education than their relatively more advantaged peers. Though income-based gaps in college access have narrowed in recent years, low-income students still enroll in college at much lower rates than higher-income students. In 2016, 67% of students in the bottom income quintile enrolled in college immediately following high school completion, a rate 16 percentage points lower than students in the top quintile (U.S. Department of Education, 2018). Income gaps in enrollment in 4- versus 2-year colleges are larger still, with 32% of students in the lowest income quintile enrolled in a 4-year institution, as compared to 78% of students in the highest quintile (Hanson, 2021). Additionally, 37% of higher-income students enroll in highly selective institutions, but only 7% of low-income students do (Hanson, 2021). The reasons for these gaps are complex, and in response, state governments have implemented a variety of policies to improve postsecondary access for economically disadvantaged (ED) students.

College entrance exams (i.e., ACT and SAT) are widely used for both merit-based financial aid eligibility and college admissions, particularly at selective institutions, and high-income students are more likely to take these exams than their low-income peers. Though most institutions in the U.S. are now test-optional, 545 remain test mandatory, meaning that college entrance exams still play an important role in admissions, particularly at selective institutions. High test scores may also provide students a competitive edge at test-optional institutions vis a vis those who opt not to submit scores (Schaeffer, 2022). Exam scores also provide important information for students on their eligibility for financial aid and competitiveness for admission to selective institutions. Without this information, students are less likely to pursue or access postsecondary opportunities for which they may be eligible or have a high probability of success.

Universal SAT or ACT test taking in high school is a low-cost policy that can increase test taking among all students and reduce the income gap in access to these exams. Several states have implemented free universal testing in which all high school juniors sit for the exam during the school day. In 2001, Colorado and Illinois became the first states to implement such a policy. Since then, 11 additional states have followed suit, requiring (and funding) either the SAT or ACT for all public high school students. Evaluations of these policies find that universal exams increase low-income students' 4-year college enrollment (Goodman, 2016; Hyman, 2017; Hurwitz et al., 2015; Klasik, 2013), yet more advantaged students are more likely to retake the exams to improve their scores, allowing exam-related gaps in postsecondary access to persist (Goodman et al., 2020). In this paper, I evaluate a 2016 Tennessee policy that expanded the existing universal ACT exam policy to include a free universal retake in fall of senior year. Using administrative data containing all ACT takers in the state before and after the retake policy, I answer the following research questions:

1) To what extent did Tennessee's free ACT retake opportunity change retaking behaviors, ACT scores, and postsecondary enrollment?
2) How do these effects differ by a student's level of economic disadvantage?

This study makes a unique contribution by bridging the literature on universal entrance exam policies with the literature on exam retaking by evaluating the first universal exam policy to include a free retake opportunity. Results indicate that the policy increased retake rates in a way that narrowed income-based gaps in retaking. However, despite a large increase in retake rates, overall scores have not improved, and gaps between ED and non-ED students have slightly widened. Any effects of the policy on ACT scores were very small, and as such, it is unlikely the policy had any downstream effects on postsecondary enrollment. I find that postsecondary enrollment declined for both ED and non-ED students in the years following the retake policy, with declines greater for ED students, resulting in a wider gap with non-ED students. These changes are almost surely due to other secular trends in enrollment unrelated to the policy. I also find that college-bound students are more likely to enroll in out-of-state (versus in-state), 4-year (versus 2-year) institutions, and institutions that require test scores for admission in the post-period.

In what follows, I review the relevant literature on postsecondary access, universal exam policies, and exam retakes. I then provide background on the policy context including details on the various ACT policies implemented in Tennessee over the study period. I describe the data sources and analytic sample, followed by an explanation of my empirical strategy. I then present the full results of the retake policy's impact on ACT retaking, scores, and postsecondary enrollment. I conclude with a discussion of the results, both in terms of the local policy context surrounding ACT and college enrollment, as well as situating the results in the broader literatures on college entrance exams and exam retaking.

Conceptual Framework

Perna's (2006a; 2006b) theory of college choice tells us that when students weigh the costs and benefits of college their calculation is informed by multiple layers of their individual context, including the information available to them and how their context influences interpretation of that information. Economically disadvantaged students face disproportionately large cost and information barriers on their path to college (Page & Scott-Clayton, 2016). A key piece of information in the college choice process is college admissions scores, because students are made aware of their potential for postsecondary success through these scores, and without testing, their belief in their potential tends to be biased downwards (Goodman, 2016). Low-income students are most impacted by this downwardly biased misinformation due to their lower propensities to take the exams, and exam mandates can combat this misinformation by nudging competitive low-income students to seek higher quality institutions once they receive their scores (Goodman, 2016). There are therefore two pathways by which a free ACT retake may induce more students to pursue college (and may have a greater impact on low-income students): (1) eliminating the monetary and time costs of pursuing a retake and (2) providing updated information on potential postsecondary success.

Literature Review

Postsecondary Access

The literature shows that ED students face cost and informational barriers in their pursuit of postsecondary education (for a thorough review of this literature, see Page & Scott-Clayton, 2016). The cost of attending college in all sectors has increased substantially in the last two decades, and the growth of that cost has outpaced the growth of family income (Page & Scott-Clayton, 2016). While most evaluations of need-based and merit-based financial aid programs find positive impacts on college enrollment (Deming & Dynarski, 2009; Page & Scott-Clayton, 2016), some merit aid programs, which typically have GPA and college entrance exam requirements, have increased racial and socioeconomic gaps in college enrollment due to stronger take-up among middle-class students (Dynarski, 2000; Page & Scott-Clayton, 2016). Though financial aid is widely available and the proportion of students receiving financial aid has increased, navigating access to available financial aid is complex, highly individualized, and requires timely and accurate information on eligibility and application requirements (Anthony, Page & Seldin, 2016; Dynarski & Scott-Clayton, 2006; Dynarski et al., 2013; Page & Scott-

Clayton, 2016). Such information barriers may explain persistent or growing gaps in access despite wide availability of financial aid. For example, in an evaluation of the place-based Promise program Knox Achieves in Knox County, Tennessee, Carruthers and Fox (2016) find large impacts on college enrollment despite the small amount of aid offered and conclude that some of the program's success is attributable to strong messaging, not just the amount of aid available. Additional evidence suggests that informational and nudging interventions targeted to lower-income students can reduce these barriers and increase college enrollment (Page & Scott-Clayton, 2016). This study contributes to this literature because the free retake opportunity is a low-cost nudge that can potentially reduce cost and information barriers for students on their path to college.

Universal College Entrance Exams

Of the 13 states with universal college entrance exam policies, evaluations have been conducted in Michigan (Hyman, 2017), Maine (Klasik, 2013; Hurwitz et al., 2015), Colorado, and Illinois (Klasik, 2013; Goodman, 2016). Hyman (2017) finds that the policy in Michigan induces college-ready students to take the exam who wouldn't have taken it otherwise and finds a 0.6 percentage point increase in 4-year enrollment overall, with larger effects for those students induced by the policy. Evaluations of the policy in Maine find intent-to-treat effects of 2- to 3-percentage point increases in 4-year enrollment, treatment-on-the-treated effects of 10-percentage point increases in 4-year enrollment (Hurwitz et al., 2015), and decreased enrollment at 2-year institutions (Klasik, 2013). Goodman (2016) implements a differences-in-differences using neighboring states as controls and finds no impact of a universal exam policy on 4-year enrollment overall in Colorado and Illinois but does find evidence of replacement of non-selective institutions with more selective institutions, arguing that some high-ability students underestimate their candidacy for selective colleges in the absence of the exam mandate. Using synthetic control states, Klasik (2013) finds increased enrollment in private 4-year institutions in Colorado and decreased enrollment in public 2-year institutions in Illinois. Taken together, these studies suggest positive impacts of universal exam policies on college enrollment, particularly in terms of replacing 2-year with 4-year institutions and non-selective with selective institutions, though effects appear to vary by state context and the chosen counterfactual. This study contributes to this literature by evaluating a universal retake policy in the context of Tennessee, an ACT dominant Southern state that also offers financial aid for in-state tuition at 2-year and 4-year colleges by way of the Tennessee Achieves and Tennessee Hope scholarships, respectively.

Exam Retaking

The available evidence suggests that retaking college entrance exams increases the probability of enrolling in college, especially for disadvantaged students who are less likely to retake exams than their more advantaged peers. Early studies of retaking college entrance exams find that the likelihood of retake is predicted by student characteristics. Using a small sample of applicants to three selective universities, Vigdor and Clotfelter (2003) find that retakes lead to higher scores, and parental education and students' self-reported ability are strong predictors of retake behavior. A study of retake behavior in Turkey found that the effects of retaking on college enrollment were greatest for disadvantaged students, and concludes that these students can meet high admissions standards if given more opportunities to do so (Frisancho et al., 2016). Goodman and coauthors (2020) provide evidence that retakes have a causal effect on college enrollment. The authors exploited discontinuous jumps in retake probability at specific scores to estimate the causal effect of retaking the SAT and found that retaking led to higher scores and increased 4-year enrollment, and effects were largest for low-income and racial minority students. A recent study of college entrance exam-taking strategies in Georgia found that income predicted retaking, and retaking the exams led to higher scores and a higher likelihood of college enrollment (Bloem et al., 2021). This study will build upon this evidence by evaluating the first free retake opportunity offered in conjunction with universal junior-year college entrance exams to determine the extent to which this retake opportunity narrows the retake gap and induces more students to enroll in college and access better quality institutions by way of higher ACT scores.

ACT Policy in Tennessee

Over the past several years, the Tennessee Department of Education has increasingly emphasized the importance of the ACT as a gateway to postsecondary access for all students. In 2009, the state passed legislation funding the free universal ACT in spring of junior year. The ACT is designed to assess college and career readiness, whereas the state's own TNReady exams assess mastery of Tennessee's grade-specific content standards. Unlike some other states with universal college entrance exams, Tennessee uses the ACT as a supplement to TNReady, not as a replacement. In 2016, the Department repurposed funds formerly used for ACT diagnostic assessments in 8th and 10th grade to provide a free ACT retake opportunity in fall of senior year.[1] For this reason, it is important to keep in mind that the "treatment" of offering a free retake includes the elimination of the diagnostic assessments. These formerly offered diagnostic assessments may have helped students perform on the ACT by (1) providing students and teachers with baseline information about student's potential ACT performance and (2) exposing students to ACT format and content prior to taking the full ACT exam in spring of their junior year.

[1] In 2014, ACT announced that it would discontinue the Plan and Explore assessments and replace them with a new assessment known as Aspire (https://www.edweek.org/teaching-learning/act-to-drop-explore-and-plan-tests/2014/01).

In the first year of implementation, the free retake was only offered on weekends at testing centers for students who participated in the junior test day. The following year, the free retake was offered in school on a school day to all seniors willing to sit for the exam in order to increase participation (for this reason, I consider 2017 to be the first post-year of full implementation for my analyses). In 2018, participation in the ACT became an explicit requirement for graduation, and ACT participation rates and scores were introduced into school and district accountability metrics in Tennessee's plan under the Every Student Succeeds Act. Following national declines in ACT participation and scores due to the COVID-19 pandemic, Tennessee encouraged all high school seniors to take advantage of the free retake opportunity in fall of 2021 by expanding the retake testing window to three days and offering three separate testing windows for districts to choose from. Due to pandemic-related disruptions, I limit the analysis of ACT outcomes to students who completed high school before the pandemic, and limit the analysis of postsecondary enrollment to students who had the opportunity to enroll in college prior to fall of 2020.

Beginning in 2021, TDOE partnered with the University of Tennessee at Martin to offer additional ACT supports for students and teachers across the state. Supports for students include an ACT Success Tactics Workshop, an ACT Mastery class, and virtual office hours, all offered for free via Zoom. Support for teachers includes ACT curriculum professional development and virtual office hours, also offered for free via Zoom. Though this partnership with UT Martin began recently and is therefore beyond the scope of this paper, these additional steps taken by the Department highlight Tennessee's ongoing commitment to improving access to the ACT despite challenges related to the pandemic and an overall trend of declining college enrollment.

Data and Sample

Data for this project comes from the P20 Connect Tennessee database, provided by the Tennessee Department of Education (TDOE) in collaboration with the Tennessee Higher Education Commission (THEC) and the Tennessee Education Research Alliance (TERA). It is supplemented with data from the National Student Clearinghouse (NSC) to observe Tennessee students who enroll in college out of state or private in-state institutions, and institutional characteristics from the Integrated Postsecondary Education Data System (IPEDS). I use 11 years of student-level data covering the academic years 2009-10 to 2019-20 that includes the universe of 11th grade ACT-takers in public schools over the observed period.

Though I use data going back as far as 2009 to control for baseline characteristics, the analytic sample is limited to fall senior cohorts across years 2014 to 2019. Limiting the analysis to these years avoids capturing the impact of the introduction of Tennessee Promise – a community college scholarship program which substantially increased 2-year enrollment beginning with the 2014 cohort. Students are observed at every instance of ACT taking, including the junior year test day, the senior retake test day, and all other national testing days in which students may opt to take the exam again independent of the junior and senior exam dates offered at their high school.[2] The final analytic sample across these cohorts totals 350,978 students, and cohort sizes range from approximately 60,000 to 65,000 students. For outcomes related to the ACT, all 350,978 students are included in the analysis. For outcomes related to postsecondary enrollment, the final cohort (2019) is excluded from the analysis because their college enrollment in fall of 2020 was impacted by the pandemic (N = 291,735). For outcomes

[2] National testing days are typically offered exclusively on Saturdays except in cases where students cannot take the test on a Saturday for religious reasons. Saturday tests are offered at ACT testing centers which are typically local high school or university campuses who opt to become an official Saturday testing center. https://www.act.org/content/act/en/products-and-services/the-act/registration/non-saturday-testing.html

related to postsecondary institutional characteristics, the analytic sample is conditional on college enrollment (N=193,265).

Measures

Dependent Variables

Analyses and results are organized into two sections: (1) outcomes related to the ACT and (2) outcomes related to postsecondary enrollment. ACT outcomes include a student's first and highest ACT score and binary indicators of retaking the ACT and earning a score greater than 20, which is the threshold for financial aid eligibility at 4-year institutions in Tennessee via the Tennessee HOPE Scholarship. Postsecondary enrollment outcomes include binary indicators of enrolling in college within 16 months following high school graduation, and whether a student's first institution was a 2-year versus 4-year institution, an in-state versus out-of-state institution, and a test-required versus test-optional institution.

Economic Disadvantage

Because the second research question asks whether the retake policy differentially impacts ED students, selecting a measure of student-level economic disadvantage is critical to the study. Over the study period, TDOE changed their process for identifying ED students. Historically, students were identified as ED based on eligibility for free- or reduced-price lunch (FRPL), which required family income to be below 185% of the federal poverty line. Beginning in 2016, ED identification became based on direct certification of eligibility for government assistance programs (i.e., TANF or SNAP), or a student being flagged as runaway, homeless, migrant, or in foster care.[3] This is further complicated by the Community Eligibility Provision (CEP), a federal program that provides free meals to all students in schools (or districts) where at

[3] https://www.tn.gov/content/dam/tn/education/rpt-crd/2021-22_Report_Card_Technical_Document_FINAL.pdf

least 40% of students are directly certified.[4] Though the state still collects lunch applications, families in CEP schools have less incentive to return the forms, because their child will receive free lunch regardless, leading to lower identification of ED students due to missing information. Over time, the transitions to both direct certification and CEP have led to a smaller number of students across the state being classified as ED each year (see Appendix Figure A1).

Due to these challenges, I define student-level ED in three different ways to ensure that results are robust to different measures of ED. For the results presented in the main paper, I define ED as a binary indicator of whether a student was ever classified as ED over the first four years of their high school career. In this case, the analysis contrasts changes over time for students ever classified as ED and students never classified as ED during high school. I repeated the analysis using alternative measurements of ED, the results of which are shown in the appendix (Tables A1 through A4). These alternative measures include a binary indicator ED status in 8th grade (Tables A3 and A4) and a categorical measure of the number of years (0 to 4) classified as ED in high school (Tables A1 and A2). The latter approach is modeled after Michelmore and Dynarski (2017), who demonstrated that achievement gaps widen as students are more persistently ED, when defining persistent ED as the number of years over which a student qualified for FRPL. The results presented in the main paper are robust to the alternative measures of economic disadvantage shown in the appendix.

Covariates

Additional student-level covariates included in fully specified regression models include student race, sex, and whether the student is identified as an English Language Learner or as a

[4] https://fns-prod.azureedge.us/sites/default/files/cn/CEPfactsheet.pdf

student with a disability. I control for baseline student performance using 8th grade math and ELA standardized test scores.[5]

Analytic Approach

It is important to note that the free retake policy applied to all high school seniors in the state of Tennessee; as such, there is no natural control group observed in the state in 2017 and later that was *not* affected by the policy. This creates challenges for separating the effect of the policy from other factors that may have affected ACT test taking and scores over time. My analytic approach attempts to estimate the effect of the free retake policy by contrasting mean outcomes of observationally similar students—that is, with similar baseline test scores and demographics—before and after the policy. Under the assumption that secular changes over time in outcomes would have been similar for ED and non-ED students in the absence of the policy, I also contrast changes over time for ED and non-ED student to assess how gaps between these two groups change after the introduction of the retake policy.

Operationally, I estimate the following ordinary least squares regression in which *Yit* is an outcome for student *i* in year *t* (either an ACT-related or postsecondary enrollment outcome). *ECONDISi* is a binary indicator equal to one if the student was ever classified as ED during high school (and zero otherwise); *POSTt* is an indicator for cohorts who were seniors in fall of 2017 and later (who were exposed to the retake policy), and ***Xi*** is vector of time-invariant student covariates described above:

$$(1) \qquad Y_{it} = \gamma_0 + \gamma_1 ECONDIS_i + \gamma_2 POST_t + \gamma_3 ECONDIS_i * POST_t + \gamma_k \boldsymbol{X}_i + \varepsilon_{it}$$

[5] Test score data come from TNReady assessments across years 2016 to 2019 and the prior TCAP assessments across years 2009 to 2015. Due to problems in the first computer-based administration of TNReady in 2016, the majority of scores are missing for that year. Where available, missing scores are imputed from prior years. All scores are standardized by grade, subject, and year to have a mean of zero and standard deviation of 1.

The coefficient γ_1 captures baseline differences in outcomes between ED and non-ED students in pre-policy period. The main effect on *POST*, γ_2, estimates the change over time in outcomes for observationally similar non-ED students. The interaction coefficient, γ_3, provides an estimate of how the policy differentially impacted the outcomes of ED students as compared to their non-ED peers:

$$\gamma_3 = \{E[Y_{it} \mid ECONDIS_i > 0, POST_t = 1, \boldsymbol{X}_i] - E[Y_{it} \mid ECONDIS_i = 0, POST_t = 1, \boldsymbol{X}_i]\}$$
$$-\{E[Y_{it} \mid ECONDIS_i > 0, POST_t = 0, \boldsymbol{X}_i] - E[Y_{it} \mid ECONDIS_i = 0, POST_{ti} = 0, \boldsymbol{X}_i]\}$$

Again, without a true control group, one should use caution when interpreting the results from this regression as causal. It is possible there exist unmeasured, time-varying factors that affected the outcomes of all students in the state during this time; it is also possible that unmeasured factors affected ED students differentially from non-ED students. Through the inclusion of baseline covariates and careful selection of the analytic sample (for example, excluding years most likely to be affected by other policy changes), I have attempted to minimize the influence of other factors. That said, the presence of unmeasured factors remains a potential threat to causal identification.

Results

Descriptive Statistics

Descriptive statistics are reported in Table 1 by the number of years of high school a student was classified as ED, using the analytic sample, years 2014-2019. Table 1 shows that as students become more persistently ED, they are more likely to be Black and less likely to be white or Asian. ED students are more likely to be an English Language Learner or have a disability than students who were never ED during high school. The last two rows show a strong pattern in terms of baseline math and English standardized test scores, in that students who were never classified as ED during high school have almost a one-half of a standard deviation higher average performance than students classified in just one year. As students become more persistently ED, moving across the columns, baseline test scores continue to decrease, and that decrease is larger in English than it is in math.

Average ACT and postsecondary enrollment outcomes are reported for the analytic sample in Table 2 by the number of years of high school a student was classified as ED. Table 2 shows that as students become more persistently economically disadvantaged, they are less likely to take the ACT, their first and highest scores decrease, and they are less likely to score greater than 20 points, making them eligible for the Tennessee HOPE Scholarship. Average postsecondary outcomes do not all change incrementally in the same way as ACT outcomes do as students become more persistently ED. However, ED students across all groups are less likely to enroll in college, 4-year institutions (versus 2-year), out-of-state institutions (versus in-state), and institutions that require test scores for admission, than students who were never ED during high school.

Table 3 demonstrates how the composition of students retaking the ACT changes in the post-period as compared to the pre-period. Representation of retakers among most racial subgroups remains stable, however, the proportion of Hispanic students retaking the exam increases by about three percentage points. There is also greater representation of English Language Learners, students with disabilities, and ED students among retakers after the free retake policy was implemented. Perhaps most importantly, the last two rows of Table 3 show that retakers are, on average, lower performing at baseline in the post-period as compared to the pre-period. Because these summary statistics are purely descriptive, it is unclear to what extent these changes in the composition of retakers is due to the policy versus due to general changes in the population of high school students over the study period. However, it is important to note that as retaking becomes nearly universal in the post-period, there is greater representation of some student subgroups that are historically lower performing on college entrance exams.

ACT Retaking and Scores

Estimated regression coefficients from models predicting ACT retaking and scores are shown in Table 4. In each column, the coefficient on *Post* represents the change in outcomes in the post-period for students who were never identified as ED during their high school career. The coefficients on the interaction between *Post* and *EconDis*, show the pre-to-post difference in outcomes between ED and non-ED students. Column 1 shows the estimated impact of the policy on retaking the ACT. The coefficient on *Post* indicates that the probability of retaking increased by 20.4 percentage points in the post-period for students never identified as ED. The positive and statistically significant coefficient on the interactions between *Post* and *EconDis* indicates that the probability of retaking increased by 13 percentage points *more* for ED students in the post-period than non-ED students. This suggests a narrowing of the gap in retaking between ED and non-ED students by 13 percentage points.

Column 2 of Table 4 shows the impact of the retake policy on the first attempted ACT score. Though highest earned scores will be those considered for college admission and financial aid eligibility, the first earned score is of interest for three reasons. First, offering a free retake has a potential unintended consequence of lowering the stakes (and thereby, reducing effort) on the first free administration of the test, which may be demonstrated by lower average first scores. Second, a closer look at test-taking behavior in the data suggests that the retake policy may have changed the test-taking strategies of some students, such that some begin attempting the ACT earlier (i.e., before the junior test day), perhaps due to increased awareness of the benefits of taking the exam multiple times, while others put off their first attempt until the senior retake opportunity.[6] And third, as noted above, the free retake policy was funded by a reallocation of funds formerly used for 8th and 10th grade diagnostic assessments. Therefore, prior to the retake policy being implement, students had exposure to ACT content and formatting via the diagnostic assessments in advance of the junior test day. After the retake policy went into place, students would not necessarily have any prior exposure to the ACT before the junior test day. Because prior exposure may be beneficial to a student's first earned score, interpretation of the treatment effect of offering a free retake must also consider the elimination of diagnostic assessments as part of the treatment. Considering these potential behavioral and strategic responses is important for interpreting our results and understanding the policy implications. The coefficient on *Post* in Column 2 shows us that non-ED students had lower first scores, on average, by about 0.15 points, after the retake policy was implemented. The negative coefficient on the interaction of *Post* and *EconDis* tells us that first scores decreased *more* for ED students as compared to their non-ED peers. Though this indicates a widened gap in first earned scores, this coefficient is very small in magnitude, less than one-tenth of a point.

Columns 3 and 4 look at effects of the policy on the highest earned score and whether the student scored a 21 or higher. In Column 3, we see a null effect on highest earned score for non-ED students, and a statistically significant decrease in highest earned score for ED students that is less than one-tenth of a point lower than non-ED students. Column 4 shows that non-ED students were just under 1 percentage point less likely to earn a score greater than 20 in the post-period as opposed to the pre-period, with no significant difference found between ED and non-

[6] Prior to the retake policy, 16% of students took their first exam before the junior test day, 72% took their first exam on the junior test day, and 12% took their first exam after the junior test day. After the retake policy was implemented, 12% of students took their first exam before the junior test day, 70% took their first exam on the junior test day, and 18% took their first exam after the junior test day.

ED students in their likelihood of scoring greater than 20. Taken together, these findings indicate that overall scores have not increased after the retake policy was implemented, and there is a very small widening of the score gap between ED and non-ED students.

Postsecondary Enrollment

Estimated regression coefficients from models predicting postsecondary enrollment outcomes are reported in Table 5. Because the magnitude of the effects on ACT scores reported in the previous section are so small, and the policy does not appear to have increased overall scores, it is unreasonable to suggest that the retake policy changed college enrollment trends by way of higher ACT scores. Therefore, the results reported in this section should not be interpreted as effects of the retake policy, but as a description of overall trends in college enrollment over the post-period as compared to the pre-period, for both non-ED and ED students.

Column 1 of Table 5 looks at pre-to-post policy change in college enrollment. The coefficient on *Post* indicates that enrollment declined for non-ED students by just under 2 percentage points, and the interaction coefficient shows that college enrollment declined more for ED students, by about 3 percentage points. Though college enrollment is down overall, results in columns 2 through 4 are conditional on college enrollment and suggest some slight changes in institutional selections in the post-period for those who do enroll in college. In columns 2 through 4, the coefficients on *Post* indicate that non-ED students are more likely to enroll in 4-year (versus 2-year), out-of-state (versus in-state), and test-required institutions in the post-period than they were in the pre-period. The null interaction coefficients across columns 2 through 4 indicate that there is no significant difference in these outcomes between ED and non-ED students in the post-period as compared to the pre-period, which implies that college-bound

ED students may also be more likely to enroll in 4-year, out-of-state, and test-required institutions than they were previously.

Discussion

Results for ACT outcomes suggest that the free retake policy increased the probability of retaking the ACT for all students, but that the effect was much larger for ED students, narrowing the gap in retake rates by 13 percentage points. First earned scores are slightly down and are down slightly more for ED students than non-ED students. There appears to be no significant change in the highest earned score for non-ED students, with a slight decrease for ED students. Overall, though the policy has substantially increased ACT retaking, it has not done much to change overall scores, and any changes seen in scores are negative and extremely small in magnitude. Because the effects on ACT scores are so small, any small effects on postsecondary outcomes related to the policy are likely drowned out by a long-run downward trend in college enrollment in Tennessee. However, postsecondary analyses are still informative of recent trends in college enrollment and suggest that Tennessee students are more likely to enroll in 4-year, out-of-state, and test-required institutions in recent years than they were historically.

There are several explanations for why the retake policy may not have improved overall scores, and in turn not impacted college enrollment. First, the elimination of ACT diagnostic assessments in grades 8 and 10 may have reduced student preparedness for the first administration of the full ACT, which may partially explain the small reductions found in first earned scores. Having a free retake opportunity may also have reduced the pressure to perform well on the first attempt, thereby, reducing effort and/or preparation, which may also partially explain a reduction in first earned scores. Additionally, many institutions have been transitioning to test-optional admissions, which lowers the stakes of the exam overall, if students are more likely to have the option of omitting their scores when applying to college. Finally, because college enrollment has been trending downward overall, there is a chance that fewer students in the post-period are motivated to perform on the ACT because they do not have plans to go to college.

Perhaps most importantly, all prior literature on retaking college entrance exams finds that retaking exams leads to higher scores, on average, which suggests that such a retake policy should boost scores, but this work has exclusively drawn on data from those who retake voluntarily. Students who seek out retakes on their own will be inherently more motivated to improve their score on a second attempt. Because Tennessee is offering the first universal free retake opportunity in the country, this study is the first to examine the effects of retaking on a broader population of students. It may be the case that those students in Tennessee who wanted to improve scores by retaking were already doing so prior to the policy, and those who are induced into retaking by way of the free retake policy are not as likely to increase their score with an additional attempt.

Although it appears that the policy has not had as large of a positive impact on ACT scores and college enrollment as one may have hoped or expected, that does not mean that the policy is not worthwhile. It has substantially increased retake rates and narrowed the gap in access to retaking between ED and non-ED students. Anecdotally, families are largely in favor of the policy because it streamlines the ACT process substantially for college-bound students, in that they do not have to register, pay, or be transported to a testing center on a weekend to access the exam. TDOE recently won an inaugural State Equity and Access Champion award from the ACT for this policy, and indeed, it does reduce barriers and expand opportunities for those who choose to take advantage of it. The policy is relatively low cost, at about $33 per student, totaling

$2 million annually. Discussions with state and local practitioners suggest that the implementation of the policy is largely determined at the school-level, such that schools are putting varying degrees of effort into promoting and preparing for the retake opportunity. The state may consider alternative strategies for motivating students to prepare for and perform on the ACT and seek out individual schools and districts with higher implementation fidelity and better outcomes in order to identify best practices for improving scores.

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Tables

Table 1. Mean covariates by years economically disadvantaged

	0 Years	1 Year	2 Years	3 Years	4 Years
White	0.861	0.722	0.691	0.630	0.584
	(0.346)	(0.448)	(0.462)	(0.483)	(0.493)
Black	0.0913	0.229	0.264	0.332	0.382
	(0.288)	(0.420)	(0.441)	(0.471)	(0.486)
Asian	0.0272	0.0218	0.0179	0.0121	0.0104
	(0.163)	(0.146)	(0.133)	(0.109)	(0.102)
Hispanic	0.0361	0.103	0.107	0.101	0.0913
	(0.187)	(0.304)	(0.309)	(0.302)	(0.288)
ELL	0.0460	0.115	0.120	0.113	0.103
	(0.209)	(0.319)	(0.325)	(0.317)	(0.304)
SWD	0.0827	0.128	0.136	0.156	0.150
	(0.275)	(0.334)	(0.342)	(0.362)	(0.357)
Female	0.496	0.496	0.495	0.506	0.516
	(0.500)	(0.500)	(0.500)	(0.500)	(0.500)
Z-Math	0.517	0.0682	-0.0104	-0.164	-0.188
	(0.917)	(0.927)	(0.931)	(0.961)	(0.946)
Z-English	0.460	0.00751	-0.121	-0.278	-0.326
	(0.880)	(0.913)	(0.915)	(0.931)	(0.933)
N	168566	39624	39304	55360	79635

Note. mean coefficients; standard deviations in parentheses

Table 2. Mean dependent variables by years economically disadvantaged

	0 Years	1 Year	2 Years	3 Years	4 Years
Retake ACT	0.775	0.700	0.649	0.592	0.507
	(0.418)	(0.458)	(0.477)	(0.492)	(0.500)
First Score	20.91	18.14	17.56	16.89	16.78
	(4.985)	(4.457)	(4.214)	(4.023)	(3.910)
Highest Score	22.17	18.98	18.32	17.52	17.35
	(5.374)	(4.759)	(4.491)	(4.277)	(4.122)
Score > 20	0.591	0.335	0.282	0.222	0.206
	(0.492)	(0.472)	(0.450)	(0.416)	(0.405)
PS Enroll	0.654	0.421	0.502	0.389	0.511
	(0.476)	(0.494)	(0.500)	(0.487)	(0.500)
4 Year	0.623	0.495	0.480	0.455	0.448
	(0.485)	(0.500)	(0.500)	(0.498)	(0.497)
Out of State	0.135	0.0813	0.0815	0.0718	0.0707
	(0.341)	(0.273)	(0.274)	(0.258)	(0.256)
Test Required	0.579	0.440	0.415	0.380	0.364
	(0.494)	(0.496)	(0.493)	(0.485)	(0.481)
N	168566	39624	39304	55360	79635

Note. mean coefficients; standard deviations in parentheses

Table 3. Mean demographics of retakers – pre versus post

	Pre-Policy	Post-Policy
White	0.733	0.737
	(0.447)	(0.440)
Black	0.232	0.213
	(0.422)	(0.409)
Asian	0.026	0.023
	(0.161)	(0.149)
Hispanic	0.050	0.083
	(0.219)	(0.276)
Native	0.003	0.004
	(0.054)	(0.063)
Other Race	0.001	0.001
	(0.038)	(0.038)
Multi-Race	0.014	0.022
	(0.117)	(0.147)
ELL	0.070	0.097
	(0.255)	(0.296)
SWD	0.052	0.117
	(0.223)	(0.321)
EconDis	0.462	0.510
	(0.499)	(0.500)
Female	0.567	0.496
	(0.595)	(0.500)
Z-Math	0.421	0.261
	(0.920)	(0.946)
Z-English	0.327	0.159
	(0.903)	(0.939)
N	95,919	161,151

Note. mean coefficients; standard deviations in parentheses

Table 4. Regression coefficients for ACT outcomes

	(1) Retake	(2) First Score	(3) Highest Score	(4) Score > 20
Post	0.204***	-0.146***	0.0654	-0.0092**
	(0.00753)	(0.0344)	(0.0404)	(0.00341)
EconDis	-0.219***	-0.853***	-1.294***	-0.1198***
	(0.0068)	(0.0483)	(0.0606)	(0.0057)
Post*EconDis	0.131***	-0.0786*	-0.0862*	0.00469
	(0.00759)	(0.0341)	(0.0396)	(0.00363)
Female	0.0775***	-0.1999***	-0.1338***	-0.0128***
	(0.0026)	(0.0209)	(0.0223)	(0.0016)
Black	0.132***	-0.7284***	-0.4698***	-0.0531***
	(0.0078)	(0.0476)	(0.0534)	(0.0055)
Asian	0.050***	1.337***	1.736***	0.0824***
	(0.0098)	(0.0140)	(0.1646)	(0.0095)
Hispanic	0.0028	-0.4693***	-0.5912***	-0.0515***
	(0.0104)	(0.0511)	(0.0728)	(0.0073)
Native	-0.0223	-0.1193	-0.1911*	-0.0165
	(0.0162)	(0.0952)	(0.0962)	(0.0113)
Multi-Race	0.0440***	0.0213	0.1268	0.0027
	(0.0077)	(0.0630)	(0.0718)	(0.0065)
Other Race	0.0321	-0.0043	0.0184	-0.0101
	(0.0230)	(0.1588)	(0.1726)	(0.0214)
ELL	0.0941***	0.1040***	0.3661***	0.0217**
	(0.0092)	(0.0586)	(0.0740)	(0.0068)
SWD	-0.0526***	0.1102***	0.0706***	0.0332***
	(0.0041)	(0.0300)	(0.0305)	(0.0041)
Reading Z-Score	0.0404***	2.604***	2.769***	0.2126***
	(0.0019)	(0.0345)	(0.0366)	(0.0029)
Math Z-Score	0.0637***	1.394***	1.571***	0.1160***
	(0.0020)	(0.0235)	(0.0259)	(0.0021)
Constant	0.711***	0.430***	0.0767***	0.398***

	(0.00448)	(0.0114)	(0.00584)	(0.0109)
N	350978	350978	350978	350978

Note. Standard error in parentheses. Standard errors are clustered at the high school level.
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 5. Regression coefficients for postsecondary enrollment outcomes

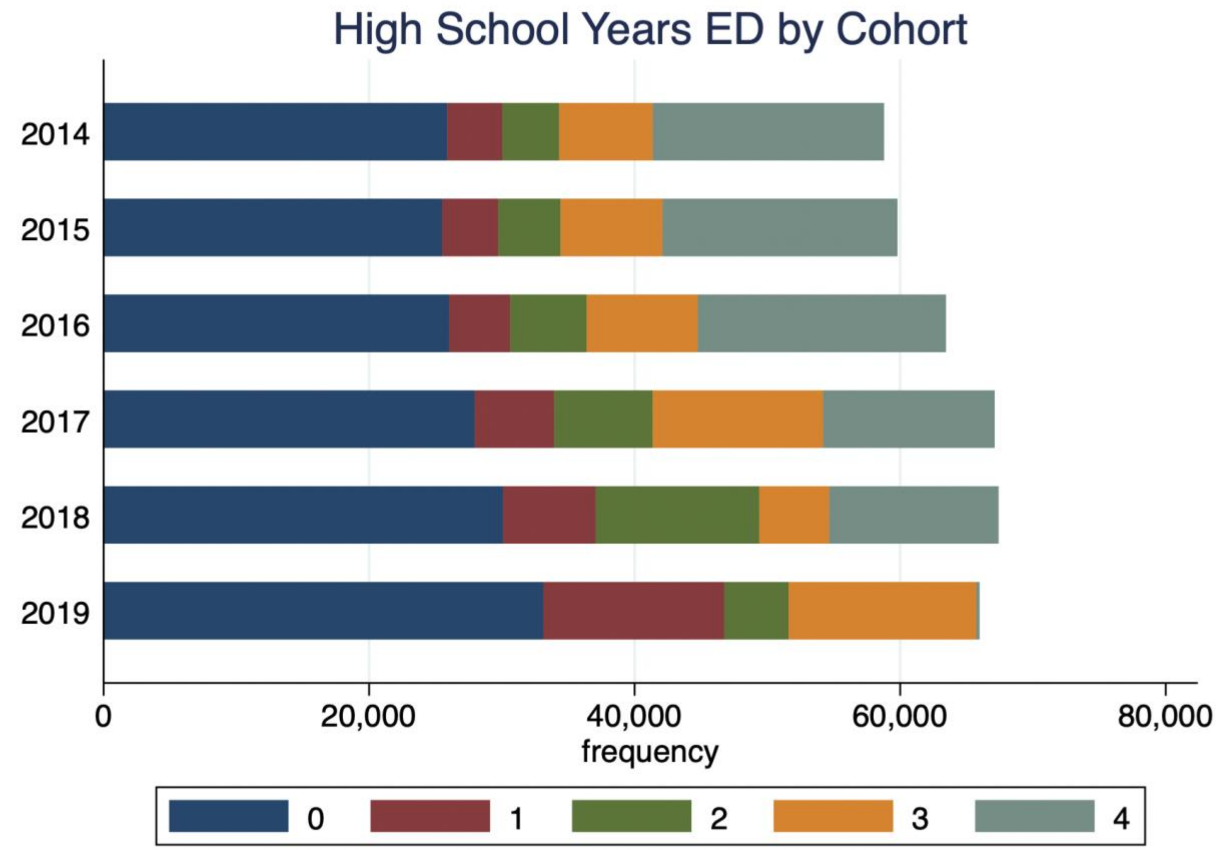
	(1) PS Enroll	(2) 4 Year	(3) Out of State	(4) Test Required
Post	-0.0175^{***}	0.0297^{***}	0.0146^{**}	0.0297^{***}
	(0.0035)	(0.00536)	(0.00383)	(0.00558)
EconDis	-0.1804^{***}	-0.1029^{***}	-0.0466^{***}	-0.1102^{***}
	(0.00406)	(0.0076)	(0.0061)	(0.0072)
Post*EconDis	-0.0311^{***}	-0.0111	-0.00728	-0.0059
	(0.00466)	(0.00665)	(0.00445)	(0.00646)
Female	0.0837^{***}	0.0213^{***}	-0.0030	0.0211^{***}
	(0.00269)	(0.0028)	(0.0020)	(0.0029)
Black	0.0918^{***}	0.2786^{***}	0.0969^{***}	0.1838^{***}
	(0.0072)	(0.0099)	(0.0056)	(0.0084)
Asian	0.0386^{***}	0.1280^{***}	0.0941^{***}	0.1311^{***}
	(0.0129)	(0.0182)	(0.0169)	(0.0160)
Hispanic	-0.0896^{***}	0.0046	0.0246^{***}	0.0083
	(0.0151)	(0.0149)	(0.0044)	(0.0127)
Native	-0.0358	0.0046	0.0143	0.0072
	(0.0207)	(0.0227)	(0.0135)	(0.0221)
Multi-Race	0.0069	0.1281^{***}	0.0493^{***}	0.1041^{***}
	(0.0091)	(0.0168)	(0.0074)	(0.0148)
Other Race	-0.0087	0.0738	0.0547^{*}	0.0814^{*}
	(0.0280)	(0.0411)	(0.0244)	(0.0379)
ELL	0.0663^{***}	0.1211^{***}	0.0029	0.1122^{***}
	(0.0154)	(0.0238)	(0.0053)	(0.0194)
SWD	-0.0571^{***}	-0.0588^{***}	0.0193^{***}	-0.0473^{***}
	(0.0044)	(0.0071)	(0.0034)	(0.0066)
Reading Z-Score	0.0873^{***}	0.1474^{***}	0.0389^{***}	0.1462^{***}
	(0.0021)	(0.0032)	(0.0036)	(0.0027)
Math Z-Score	0.0628^{***}	0.0985^{***}	0.0239^{***}	0.0985^{***}
	(0.0022)	(0.0032)	(0.0023)	(0.0030)

Constant	0.711^{***}	0.430^{***}	0.0767^{***}	0.398^{***}
	(0.00448)	(0.0114)	(0.00584)	(0.0109)
N	291735	193265	193265	193625

Note. Standard errors in parentheses. Standard errors are clustered at the high school level.
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Appendix

Figure A1. Number of years identified as economically disadvantaged by cohort



Note. Figure A1 shows the number of years over the first four years of a student's high school career that they were identified as economically disadvantaged. The shift in the distribution of years over time demonstrates how students were less likely to be identified as ED over time due to the introduction of direct certification for economic disadvantage status and the Community Eligibility Provision.

Table A1. Regression coefficients for ACT outcomes, by years ED

	(1) Retake	(2) First Score	(3) Highest Score	(4) Score > 20
Post	0.204***	-0.146***	0.0654	-0.00920**
	(0.00753)	(0.0344)	(0.0404)	(0.00341)
Post*1Yr	0.0973***	-0.168***	-0.222***	-0.0167**
	(0.00876)	(0.0452)	(0.0496)	(0.00512)
Post*2Yrs	0.110***	-0.138**	-0.145**	-0.00125
	(0.00870)	(0.0458)	(0.0500)	(0.00567)
Post*3Yrs	0.123***	-0.105*	-0.171***	-0.00387
	(0.00952)	(0.0435)	(0.0500)	(0.00488)
Post*4Yrs	0.122***	-0.0522	-0.0750	0.0101*
	(0.00966)	(0.0389)	(0.0443)	(0.00427)
Covariates	X	X	X	X
Constant	0.573***	19.28***	20.21***	0.452***
	(0.00735)	(0.0663)	(0.0830)	(0.00734)
N	350978	350978	350978	350978

Note. Results shown are for fully specified models that include an interaction with a categorical measure of economic disadvantage that is defined as the number of years of high school that a student was identified as economically disadvantaged. Though all covariates are included in these regressions, only the coefficients are shown for parsimony and to demonstrate that the results presented in the main paper are robust to this alternative measure of economic disadvantage. Standard errors in parentheses. Standard errors are clustered at the high school level.
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table A2. Regression coefficients for postsecondary enrollment outcomes, by years ED

	(1) PS Enroll	(2) 4 Year	(3) Out of State	(4) Selective
Post	-0.0319***	0.0184***	0.0111**	-0.00710**
	(0.00328)	(0.00485)	(0.00345)	(0.00264)
Post*1Yr	-0.0230**	-0.00248	-0.00762	-0.0142
	(0.00758)	(0.00971)	(0.00554)	(0.00823)
Post*2Yrs	-0.01000	-0.0203*	-0.0175**	-0.00934
	(0.00639)	(0.00910)	(0.00537)	(0.00701)
Post*3Yrs	-0.0212***	-0.0156	-0.0129*	0.000346
	(0.00634)	(0.00899)	(0.00511)	(0.00828)
Post*4Yrs	-0.0667***	-0.0165*	-0.00173	0.0000998
	(0.00556)	(0.00789)	(0.00462)	(0.00552)
Covariates	X	X	X	X
Constant	0.711***	0.430***	0.0767***	0.797***
	(0.00448)	(0.0114)	(0.00584)	(0.0110)
N	291735	193265	193265	193265

Note. Results shown are for fully specified models that include an interaction with a categorical measure of economic disadvantage that is defined as the number of years of high school that a student was identified as economically disadvantaged. Though all covariates are included in these regressions, only the coefficients are shown for parsimony and to demonstrate that the results presented in the main paper are robust to this alternative measure of economic disadvantage. Standard errors in parentheses. Standard errors are clustered at the high school level.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table A3. Regression coefficients for ACT outcomes, by 8th grade ED

	(1) Retake	(2) First Score	(3) Highest Score	(4) Score >20
Post	0.228***	-0.054	0.201***	0.0027
	(0.0074)	(0.0328)	(0.0380)	(0.0031)
Post*ED8	0.120***	-0.173***	-0.215***	-0.0051
	(0.0082)	(0.0329)	(0.0391)	(0.0034)
Covariates	X	X	X	X
Constant	0.5455***	19.15***	20.02***	0.4346***
	(0.0072)	(0.0621)	(0.0775)	(0.0069)
N	350978	350978	350978	350978

Note. Results shown are for fully specified models that include an interaction with a binary measure of economic disadvantage that is defined as whether a student was identified as economically disadvantaged in 8th grade. Though all covariates are included in these regressions, only the coefficients are shown for parsimony and to demonstrate that the results presented in the main paper are robust to this alternative measure of economic disadvantage. Standard errors in parentheses. Standard errors are clustered at the high school level.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table A4. Regression coefficients for postsecondary enrollment outcomes, by 8th grade ED

	(1) PS Enroll	(2) 4 Year	(3) Out of State	(4) Test Req'd
Post	-0.0086*	0.0315***	0.0142***	0.0321***
	(0.0034)	(0.0051)	(0.0036)	(0.0054)
Post*ED8	-0.0390***	-0.0108	-0.0044	-0.0049
	(0.0048)	(0.0065)	(0.0045)	(0.0063)
Covariates	X	X	X	X
Constant	0.692***	0.414***	0.0704***	0.380***
	(0.0049)	(0.0109)	(0.0051)	(0.0103)
N	291735	193265	193265	193625

Note. Results shown are for fully specified models that include an interaction with a binary measure of economic disadvantage that is defined as whether a student was identified as economically disadvantaged in 8th grade. Though all covariates are included in these regressions, only the coefficients are shown for parsimony and to demonstrate that the results presented in the main paper are robust to this alternative measure of economic disadvantage. Standard errors in parentheses. Standard errors are clustered at the high school level.
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$