Is the GED a Viable Pathway to College for Adult Students? New Regression Discontinuity Evidence From Massachusetts*

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Original Draft: August 2017
This Version: January 2018

Abstract

While a mature body of research has examined the labor market returns to passing the GED, past analyses that use regression discontinuity research designs typically fail to account for retaking behavior. We estimate the GED's impact on postsecondary enrollment among participants in Massachusetts' Adult Basic Education (ABE) classes, accounting for this source of bias. We leverage the multi-dimensionality of GED scoring to examine several regression discontinuities (one for each GED subtest, plus one for total GED score) and aggregate all six passing thresholds into a single measure of distance from passing. In contrast with previous work that suggests a limited role for educational attainment as a mediator of returns to the GED, we find that earning a GED credential significantly increases enrollment and persistence in postsecondary education for ABE students who marginally pass the GED. Specifically, our IV estimates indicate that earning a GED increases the likelihood that an individual ever enrolls in college by 45.3 percentage points. Additionally, we find that marginal GED passers enroll for 2.90 additional quarters, and women GED holders are 35.5 percentage points more likely to persist in college for at least six quarters. We also find correlational evidence that ABE students are more likely than the overall population of testers to retest if they fail their GED on their first attempt, but less likely to pass overall, suggesting that the ABE population is positively selected on dimensions of non-cognitive skill like grit and persistence but negatively selected on dimensions of academic skill relative to the general GED testing population. In future extensions of this work, we plan to compare ABE students with Massachusetts high school dropouts and to add labor market outcomes to the analysis.

*Special thanks to Carrie Conaway, Adrienne Murphy, Brian Newquist, Cliff Chuang, and Massachusetts Department of Elementary and Secondary Education staff for their support and leadership during this project. We are grateful to Josh Goodman, Larry Katz, Marty West, and PIER seminar participants at Harvard for helpful comments and suggestions. This project was supported by the Institute of Education Sciences, U.S. Department of Education, through grant R305B150010 to Harvard University. Administrative support from the Center for Education Policy Research at Harvard University is gratefully acknowledged. Correspondence can be addressed to the authors at: bheller@fas.harvard.edu (Heller) and kslung@g.harvard.edu (Slungaard Mumma). All errors are our own.

1 Introduction

Returns to education grew substantially during the last quarter of the 20th century and into the 21st as demand for highly skilled workers outstripped supply (Autor 2014, Goldin & Katz 2009). During this period, U.S. workers who did not hold a high school diploma experienced wage stagnation and disproportionate rates of unemployment, both during periods of economic recession and periods of relative economic prosperity (Cameron & Heckman 1993; Rouse 2005; Heckman, Stixrud, & Urzua 2006; Autor 2014). One of the primary benefits of a high school diploma is access to postsecondary education, which has been shown to have high returns, even for academically marginal students (Carnevale, Rose, and Cheah 2013; Zimmerman 2014; Goodman, Hurwitz, and Smith 2017). The GED provides an opportunity for students who did not earn a traditional high school diploma to earn a high school equivalency (HSE) credential that meets minimum educational attainment standards required by most postsecondary education institutions, as well as some jobs and vocational training programs.

Past regression discontinuity analyses of the returns to passing the GED have estimated LATEs for all GED test takers near the passing threshold in a given state or group of states (Tyler Murnane, & Willett 2000; Tyler 2004; Lofstrom & Tyler 2008; Jepsen, Mueser, and Troske 2016, 2017). We examine the impact of earning a GED for a self-selected population of students in Massachusetts who are the primary recipients of public investment related to the GED: students in public Adult Basic Education classes. From a policy perspective, a major question related to the GED is whether to continue investing public resources in preparing students to pass the GED and earn an HSE credential, given that recent evidence suggests minimal labor market benefits for the marginal passer (Jepsen, Mueser, & Troske 2016). It is an open question as to whether the statewide LATE at the margin of passing generalizes to the subset of individuals who participate in GED preparation classes that are funded or subsidized with public resources.

If ABE students select into these classes because they are relatively weak academically and need extra help to pass, then the marginal GED passer who participates in ABE may have less latent ability than the average marginal GED passer, which could diminish their expected academic or labor market outcomes. Conversely, if ABE students select into GED preparation classes because they have particular educational or job-related goals or are better suited to a structured educational environment than the average GED test-taker, they may be expected to benefit disproportionately or be more likely to use their GED to access further education or training. Enrolling in an ABE

course demonstrates a willingness to build academic skills in a traditional schooling environment, and executing a plan to prepare for and take the GED exam requires organizational skills, prior planning, and persistence.

In this paper, we will examine the impact of earning a GED on rates of postsecondary enrollment, persistence, and degree attainment for students who participate in ABE classes in Massachusetts. While a mature body of research has examined the value of the GED in the labor market using regression discontinuity (RD) research designs, Jepsen, Mueser, and Troske's (2016) analysis of the returns to the GED in Missouri calls into question the methodology of over a decade of findings. Jepsen, Mueser, and Troske (hereafter "JMT") note the importance of accounting for retaking behavior, ignored in previous regression discontinuity analyses used to measure the impact of the GED, in constructing and interpreting quasi-experimental evidence. We build on JMT's (2016, 2017) methods, examining several regression discontinuities (one for each subtest, plus one for overall score) and aggregating all discontinuities into a single measure of distance from passing. Each discontinuity can be used to estimate a different Local Average Treatment Effect (LATE) of the impact of passing the GED on college outcomes. Our analysis highlights the value of examining LATE estimates from multiple discontinuities when multiple rating scores influence first-stage outcomes, and policies may have heterogeneous impacts for individuals who are constrained at different margins.

We find that for the marginal ABE student who crosses the passing threshold, earning a GED increases the likelihood of ever enrolling in college by 45.3 percentage points, driven by enrollment in two-year colleges. Additionally, we find that among ABE students, the marginal GED passer enrolls in college for 2.90 additional quarters, and the marginal woman who earns her GED is 35.5 percentage points more likely to persist in college for at least six quarters. We also find correlational evidence that ABE students are more likely than the overall population of testers to retest if they fail their GED on their first attempt, but less likely to pass overall conditional on their first attempt scores, suggesting that the ABE population may be positively selected on dimensions of non-cognitive skill like grit and persistence but negatively selected on dimensions of academic skill relative to the general GED testing population.

The next section provides a description of Adult Basic Education services offered in Massachusetts, an overview of HSE credential options in Massachusetts, and a review of past-research on HSE credentials. The third section describes our data. The fourth section describes our empirical strategy. The fifth section presents results, and the sixth section concludes, discussing potential

explanations of the patterns we observe as well as directions for future analyses.

2 Overview of ABE, HSE, and Past Research

2.1 Adult Basic Education in Massachusetts

In Massachusetts, ABE encompasses a suite of low-cost and no-cost public education services for adults provided by learning centers throughout the state. ABE classes are offered on a wide range of topics, but the most popular courses are HSE test preparation, adult diploma programs, basic literacy and numeracy, basic computer skills, and English language courses for speakers of other languages (ESOL). Column 2 of Table 1 provides an overview of the demographics of ABE students enrolled between 2008-2016 who completed the GED between 2002 and 2013.[1] ABE students are a diverse group; they are majority minority and roughly 30% are non-native English speakers. The typical ABE student lives in a zipcode with a 16% individual poverty rate, 4.5 percentage points above the Massachusetts state average.[2] The summary statistics indicate that nearly half of ABE students who take the GED were receiving some form of public assistance (e.g. TANF, AFDC, etc.) at their time of enrollment. Only 30% of ABE students were employed at enrollment, which is consistent with survey data showing nearly 70% of ABE students indicate that getting a new or better job is of primary importance to them (Massachusetts Workforce Investment Board 2008).

Roughly 20,000 students attend at least 12 hours of ABE instruction in Massachusetts each year, but demand for services far outstrips supply. In August 2017, there were over 17,000 individuals on waitlists for ESOL courses, as well as over 2,400 students on waitlists for other ABE courses and services.

2.2 High School Equivalency Credentials in Massachusetts

Since its development in 1942, the GED exam has been the most prominent high school equivalency credential for U.S. students who do not earn a high school diploma. It is the only nationally recognized HSE test in the United States,[3] and until 2014, it was the only test that students could

[1] This represents roughly half of students who enrolled in a non-ESOL ABE class during that period. An additional 6,287 students, about one-third of the non-ESOL ABE students during that period, are observed taking the HiSET exam between 2014-2016. In results not presented here, we find that ABE GED completers are representative of non-ESOL ABE participants. Summary statistics for the full sample of ABE participants are available from the authors by request.

[2] State and zip-code poverty rates can be found at https://www.census.gov/quickfacts/MA and https://www.census.gov/data.html

[3] See https://www.gedtestingservice.com/testers/history for more information about the history of the GED.

take to earn a HSE credential in Massachuetts. From 2014-2016, Massachusetts switched from using the GED to award HSE credentials in favor of the HiSET exam. Since January 2017, Massachusetts residents may pass either the GED exam or the HiSET exam in order to earn a Massachusetts HSE Credential.[4]

Both the GED and HiSET exams are a battery of five timed tests covering Reading, Writing, Mathematics, Social Studies, and Science. Tests can be taken individually over the course of several days, months, or even years, and students are allotted just over seven hours to complete the full battery.[5] To pass the GED during the period we consider (2002-2013), individuals were required to earn a minimum score of 410 (out of 800) in each of the five subtests and an overall average score of 450 across the five subtests (for a minimum total score of 2250 out of a possible 4000 points).[6] In Massachusetts, individuals may retake GED subtests as many times as they like, but if an individual fails any subtest three times, they must wait 60 days between each subsequent attempt on that subtest. GED scores do not expire, except when the test series changes, which has happened four times since the first test series was released in 1942 (1978, 1988, 2001, and 2014).

Most two- and four-year colleges in Massachusetts require a high school diploma or high school equivalency credential in order to enroll. Although students may enroll in GED programs with goals related to higher education, prior research suggests that few students who obtain a GED go on to complete a postsecondary degree (Tyler 2003; Heckman Humphries, & Kautz 2014; JMT 2016).

2.3 Past Research on the High School Equivalency Credentials

An extensive literature examines the impact of passing the GED for individuals who do not hold a traditional American high school diploma. Heckman, Humphries, and Kautz (2014) review past analyses of the labor market value of the GED and present a survey of estimates from different nationally representative datasets that rely on a selection-on-observables assumption to assess the labor market value of the GED. They find no evidence that the GED has significant value in the

[4] A small number of students earn their HSE credential through Massachusetts' adult diploma programs, which do not require students to take the GED, HiSET, or any standardized high-stakes test. In email correspondence, Mass DESE reports that 1,081 students completed an Adult Diploma program in Massachusetts between 2008-2013, an average of 180 students per year.

[5] While Massachusetts now offers students the option to take either exam to earn an HSE, this analysis will focus on cohorts of students for whom the GED was the only HSE credential option. As such, we will not discuss details of the HiSET in this analysis. See https://hiset.ets.org/ for further information about the HiSET.

[6] In 2014, the GED introduced its fifth series of the test and substantially changed the scoring scale. Each subtest in the fifth series is scored on a 100-200 point scale, and Massachusetts GED testers must achieve a score of 145 on each subtest to pass (with no separate total score requirement).

labor market after conditioning on observable characteristics. Tyler, Murnane, and Willett's (2000) analysis is the first to attempt to generate causal estimates of the signaling value of the GED in an RD-like framework. Tyler, Murnane, and Willett examine a sample of 1990 GED test-takers in 42 states. They leverage differences in passing scores by state to compare the labor market outcomes (through 1995) of individuals in different states who earn the same GED score but differ in their GED credential status, estimating the impact of passing the GED exam on earnings for students on the margin of passing the test (i.e. the lowest-performing passers). They find large positive wage impacts for the marginal white GED holder, but not for minorities.[7] This analysis is part of a productive period of research measuring the value of the GED in the labor market. Subsequent analyses have explored the impact of passing the GED on various subgroups, including women (Boudett, Murnane, & Willett 2000), foreign-born students (Clark & Jaeger 2006), prisoners (Nuttall, Hollmen, & Staley 2003), and students with disabilities (Wagner et al. 2005). In addition to studies estimating the impact of passing the GED on earnings (Tyler, Murnane, & Willett 2000; Clark & Jaeger 2006; Heckman & LaFontaine 2006; JMT 2016), a variety of alternative outcomes have been examined, including recidivism (Nuttall, Hollmen, & Staley 2003), health outcomes (Kenkel, Lillard, & Mathios 2006), postsecondary education (Cameron & Heckman 1993; Maralani 2011; JMT 2016, 2017).

While there is no clear consensus about the GED credential's value in the labor market, JMT (2016) cast doubt upon the validity of past RD estimates of the credential's value. They note that past RD analyses have used "a composite score based on multiple test attempts as their forcing variable" without accounting for the endogenous nature of individuals retesting to push their final score over the passing threshold. Comparing the outcomes of individuals whose final score barely clears the passing threshold after multiple retests to individuals who choose not to retest after failing on their first attempt will likely bias results toward finding positive impacts for the GED, since individuals who retest multiple times may (1) see great value in passing the GED and (2) exhibit high levels of non-cognitive skills like grit and persistence by continuing to retake the test until they pass. JMT argue that while an individual's first GED attempt can be used to construct a valid regression discontinuity estimator, a composite score that incorporates scores after retesting cannot. Accounting for such retaking behavior among GED test-takers in Missouri from 1995-2005, JMT (2016, 2017) find no evidence that earning a GED improves labor market

[7] They hypothesize that a disproportionate number of minority GED holders taking the exam while incarcerated or through government programs could explain this heterogeneity in impact.

outcomes for marginal passers, and while they find that earning a GED leads to modest increases in postsecondary enrollment (peaking 2 semesters after first GED attempt at 4.7pp for men and 9.6pp for women), these effects fade out quickly and marginal enrollees earn very few college credits (on average, 2 credits for men and 6 credits for women).

While JMT's (2016) analysis throws conventional wisdom about the GED into question, theory suggests a complicated interplay between high school equivalency credentials, traditional high school diplomas, and labor market outcomes. Offering an alternative high school credential like the GED may encourage some students who otherwise would have obtained regular high school diplomas to drop out and pursue this less valuable credential (Tyler, 2003; Heckman, et al. 2012). Agodini and Dynarski (2000) present a framework for students deciding whether to continue working toward a traditional high school diploma, drop out of regular high school and pursue a high school equivalency credential, or drop out of high school and remain without any high school credential. They use this model to show how growth in GED participation relates to simultaneous efforts to make the GED easier and more accessible while raising standards for attaining regular high school diploma. Araujo, Gottlieb, and Moreira (2004) develop a model suggesting that passing the GED and attaining a HSE in lieu of a traditional high school diploma conveys a mixed signal to employers about an individual's skills, suggesting relatively high cognitive skills but low non-cognitive skills. They postulate the impact of passing the GED on labor market outcomes will depend upon the relative weights employers place on different types of skills in making hiring and wage-setting decisions.

3 Data

Our analysis uses data collected by the Massachusetts Department of Elementary and Secondary Education (Mass DESE) to monitor ABE programs and meet federal reporting guidelines.[8] Our final dataset merges separate files from ABE programs, GED test administration, and National Student Clearinghouse (NSC) record matches. The ABE program file includes student name, date of birth, social security number, ABE ID, gender, race/ethnicity, ABE class enrollment, employment status at enrollment, native language, country of origin, address, and measures of pre-enrollment academic performance (pre-test scores) for each student who enrolled in ABE classes between 2008 and 2016. The GED test administration file includes student name, date of birth, social security

[8] All ABE programs that are overseen by the Adult Community Learning Services (ACLS) division of Mass DESE receive public funding and nearly all are subject to federal reporting and compliance standards. ACLS collects the same information for all ABE participants regardless of the source of funding for their program or class.

number (or other ID number), gender, race/ethnicity, and test results by date for each subtest a student attempted between 2/1/2002 and 12/31/2013. The NSC file includes ABE ID, dates of enrollment, college names, college type (two-year vs. four-year), and indicators for degree or certificate attainment. NSC records were linked to internal ABE ID numbers supplied to NSC by Mass DESE.[9]

NSC records were easily linked to ABE program files using the common identifier. GED records were linked to the ABE program file using first name, last name, social security number, date of birth, and gender. Any record that matched on all four identifiers (first name, last name, social security number, and date of birth) was automatically accepted as a match. This represents 11,838 of the 17,778 total matches (66.0%) that comprise our ABE sample. Any record that matched on three of those four identifiers was manually reviewed; nearly all, 5300/5346 matches were accepted. For remaining observations, we ran the "reclink2" program in Stata to identify close matches that we may have missed through exact matching (e.g. misspellings, misreported birth dates, inconsistent use of nicknames or maiden/married names, reversed first and last name, observations with missing social security numbers, etc.).[10] When we were unsure of whether a potential match accurately represented the same person in both datasets, we erred on the side of discarding potentially incorrect matches.

GED test score files include an indicator for whether an individual passed the test and an indicator of whether an individual earned a credential. The two variables match for all but 16 observations (103,141/103,157) in the full GED sample and all but one observation (17,777/17,778) in the ABE subsample. While we can calculate our own measure of GED passing by checking

[9]Mass DESE submitted all ABE students with valid name and date of birth information to NSC between 2008 and 2013. NSC returns a matching record for 99.78% (76,980/77,146) of ABE students enrolled during this period. However, 12.8 percent of ABE students are excluded from our RD samples because their last NSC record was recorded before they took the GED for the first time. These individuals are recorded as having a missing NSC record in Table 1. Additionally, Appendix Table A1 presents NSC match rates for each RD sample.

[10]The reclink2 program searches for close matches along a set of user-specified variables and returns a match score between 0 and 1 for each successful match that is increasing in the closeness of the match. Each observation above a minimum matching score value of 0.6 with at least 2 exactly matching components out of first name, last name, date of birth, and SSN were manually reviewed; 618/3,264 were accepted as matches (18.9%). All remaining observations with match scores above 0.85 and at least 1 exactly matching component were manually reviewed; 21/3,294 were accepted as matches (0.64%). All remaining observations with first name exactly matching their potential match's last name and last name exactly matching their potential match's first name were reviewed; 1/1 additional observation was accepted as a match (sixteen other exact name reversal cases and several other close name reversal cases were already matched in previous stages). Finally, all remaining matches with a match score of at least 0.95 (and with no exactly matching components) were manually reviewed; none of the 19 observations were accepted as matches. Common examples of successful matches included observations with close misspellings of first and/or last names, but missing values for social security numbers in one database or close non-matching dates of birth (e.g. 2/7/83 vs. 2/7/88 or 7/2/65 vs. 2/7/65); observations with first and last name reversed but matching date of birth and/or social security number; observations with non-matching last-names but matching first name and social security number (sometimes with previous last names moved to middle name or middle initial).

whether an individual achieved the minimum score to pass each subset and the minimum total score summing over the five subtests, we use the GED's internal measure of passing to identify individuals who have earned a GED. Our internal calculations match the GED administrative records for 99.69% of observations (102,833/103,157) in the full GED sample of GED completers and 99.60% in the ABE subsample (17,706/17,778). In light of the possibility of test abnormalities, cheating, and other avenues by which an apparently passing score might be disqualified, we use the GED's administrative marker for passing as our measure of whether an individual passed the GED.[11]

Table 1 presents baseline demographic characteristics for our analysis samples.[12] Column 1 presents sample means for the limited demographic information that is available for all GED completers, regardless of whether they appear in the ABE database. Column 2 presents sample means of the more detailed set of demographic variables available for ABE students who completed the GED. Columns 3-6 present sample means for the complete set of demographics for the various subsamples that we use to construct our RD estimates. While the sample of GED completers who attended ABE classes appears to be older and less white than the general population of GED completers, the subsamples that are used to construct our RD estimates are only older, with a racial composition similar to the overall population of GED completers. Generally, individuals in the RD subsamples appear to be slightly less disadvantaged than the overall population of ABE GED completers. This may be driven by the fact all individuals who passed the GED on their first attempt comprise the "right-hand side" of the regression discontinuity for all RD samples, because all subtests are binding by definition for individuals who passed all parts of the GED. The next section discusses the assumptions underlying our regression discontinuity estimator and reviews our sample construction.

4 Empirical Strategy

To estimate the causal impact of GED attainment, we construct several "fuzzy" regression discontinuity estimators that identify LATE parameters for the impacts of earning the GED for individuals at particular passing thresholds who are constrained by their first GED test score. We cannot assess the impact of the GED on college outcomes by simply comparing the outcomes of all GED

[11] Our results are robust to using our internal calculations to construct an indicator of whether an individual passed the GED.

[12] Appendix Table A1 presents demographic characteristics for our analysis samples plus individuals whose GED scores qualify them for our analysis sample but have missing NSC records.

completers who earn a GED with all GED completers who do not, because the estimates would be confounded by the fact that passing the GED is associated with higher levels of underlying academic skill and, particularly for individuals who retake the test multiple times, non-cognitive skills like grit and persistence. Furthermore, retaking the GED imposes financial and time costs on test-takers, so final scores will be higher for test-takers who can more easily afford these costs relative to their underlying academic skills.

The RD design allows us to identify the impact of plausibly exogenous variation in GED receipt by focusing on comparing the difference in the predicted outcomes for individuals at GED passing thresholds when outcomes are predicted from data to the left of (i.e. below) the passing threshold versus when outcomes are predicted from data to the right of (i.e. above) the passing threshold. The identifying assumption for the unbiasedness and consistency of our RD estimates is that any underlying difference in the probability of earning a GED in the neighborhood of the passing threshold is captured by the smooth polynomial trends on either side of the threshold and that remaining variation is uncorrelated with unmeasured ability, driven only by the presence of the exogenously assigned threshold value (i.e. the minimum passing score). Similarly, any differences in college outcomes immediately above and below the threshold should be explained only by the difference in probability of earning a GED that is caused by individuals' value of the running variable (e.g. GED subtest score) being just above or below the threshold, net of error and the explicitly modeled trends associated with the running variable, and be uncorrelated with all other factors that influence the running variable.

We follow the guiding principles of JMT's (2016) RD design to account for endogenous retaking behavior, using an individual's first attempt on each subtest to conduct each of our regression discontinuity samples. While students are certainly motivated to earn a passing score on each subtest of the GED, the mapping from raw scores to scaled scores is unknown to students, and students are unable to systematically manipulate their scores to pass any given threshold. Figures 1a-1d demonstrate that the distribution of test scores is smooth at the discontinuity in all RD samples. There is no evidence that students were able to manipulate their scores at any passing threshold. Note that the minimum passing score creates discontinuities at different parts of the skill distribution in different subjects.[13] It is important to note that the LATE that is indentified

[13]While the minimum passing score is 410 for each of the five subtests, in the ABE sample of GED completers, this represents the 46th percentile of Math scores, the 30th percentile of Writing scores, the 20th percentile of science scores, the 19th percentile of social science scores, and the 17th percentile of reading scores. The minimum passing total score (2250) represents the 44th percentile of total scores.

by this approach is driven by differences in outcomes among students who are constrained by their first attempt score; it is not clear whether or how these results generalize to individuals who are not constrained by the monetary, psychological, and time costs of repeatedly re-taking the GED test.

There are three important differences between our fuzzy RD estimates and JMT's (2016) estimates. First, in addition to estimating the impact of passing the GED at the total score threshold, we estimate the impact of passing the GED at each subtest score threshold as well as using a single "distance-to-passing" index that measures an individual's proximity to the passing threshold on multiple subtests as well as the total score threshold. JMT (2016) only examine the impact of crossing the total score threshold, while JMT (2017) examine each subtest threshold as well as the total score threshold. Since we are working with a smaller population (ABE students versus statewide GED test takers), we rely upon the increased power from the larger sample that comes with aggregating and examining multiple thresholds. We also find that a large majority of students who fail the GED on their first attempt fail the math subtest (74.7%), and a majority of GED completers who are constrained along a single dimension are constrained by their math subtest score (59.5%). Limiting our sample to individuals who are constrained by the total score significantly reduces the power of our first stage, as only 17.0% of GED completers who are constrained along a single dimension are constrained by their total score. In principle, examining LATEs at different subtest thresholds allows us to test whether the GED has heterogeneous impacts for individuals constrained by different thresholds; however, we lack precision to distinguish between the LATE parameters estimated from different thresholds.

Second, we restrict our analysis to individuals who face a binding constraint to passing the GED along a single dimension (i.e. ceteris paribus, changing the score of that single subtest or total score from below to above the threshold, or vice-versa, would be sufficient to change their overall result from failing to passing, or vice-versa). For our estimates that combine distance from the passing threshold for all subtests and the total score, this is parallel to the binding-score RD approach outlined in Reardon and Robinson (2012) in their discussion of multiple rating score regression discontinuity (MRSRD) settings. For the individual subtest RD estimates, using the binding-score criterion to construct our sample creates a sharper discontinuity where all individuals above the threshold have, by definition, reached the minimum scores required for passing along all dimensions. MRSRD estimates that examine differences in outcomes among individuals constrained along a single dimension (i.e. their binding constraint), are more straightforward to interpret, as crossing

the threshold along a single dimension is necessary and sufficient to move from failing to passing or vice-versa in the resulting sample. Using the binding-score sample also increases the precision of our two-stage least squares estimates (2SLS) by increasing the size and precision of our first-stage estimates (i.e. the impact of crossing the threshold on GED passing).[14]

Finally, our analysis examines the impact of earning a GED for individuals who complete all five subtests, not all GED test-takers. JMT (2016) explicitly cite the fact the relationship between test score and GED receipt is irregular below 1500 and that "many of these individuals do not take all of the subtests" as a reason to constrain the bandwidth of their IV estimates to individuals who score above 1500 (and below 3000). Since individuals who do not complete all five sections of the GED cannot earn a GED and are unlikely face a binding constraint in a single subtest, we exclude these individuals from our analysis (this eliminates 11%, 2,193/19,971, of GED observations for ABE students). Following JMT, we limit our RD samples to individuals whose first subtests scores sum to between 1500-3000 for the Total Score RD sample, and to individuals whose first subtest score is between 30-60 on the relevant subtest for each subtest RD sample.

With these caveats, we follow JMT's (2016) specification to estimate the first-stage impact of reaching the minimum passing threshold on one's first GED attempt for each subtest and total score an individual's probability of ever earning a GED ($PassEver_{ij}$):

$$\begin{aligned} PassEver_{ij} =& \alpha_{0j} + \alpha_{1j} Above_{ij} + \sum_{d=1}^{D} \alpha_{bjd} [Below_{ij}(Subscore_{ij} - Cutscore_j)]^d \\ &+ \sum_{d=1}^{D} \alpha_{ajd} [Above_{ij}(Subscore_{ij} - Cutscore_j)]^d + \alpha_{2j} X + \mu_{ij} \end{aligned} \tag{1}$$

Where $Above_{ij}$ and $Below_{ij}$ respectively indicate whether individual i was above or below the passing threshold along dimension $j \in$ {Math, Reading, Writing, Science, Social Science, Total Score}. Interacting each with an individual's distance from the passing threshold ($Subscore_{ij} - Cutscore_{ij}$) along the j dimension allows the slopes of the relationship between passing the GED and their score on dimension j to vary on either side of the threshold (i.e. α_{bd} versus α_{ad}). Following JMT, we set $D = 2$ to control for a quadratic polynomial in distance above and below the threshold. Figures 2a-2d present a graphical representation of the first-stage relationships between the run-

[14]The less precise estimates that result from using the full sample of GED completers, rather than just individuals who face a binding constraint, are statistically indistinguishable from the results of our preferred specification at conventional levels.

ning variable and probability of ever earning a GED in the Multi RD[15], Math RD, Writing RD, and Total Score RD samples. For our main specifications in Tables 2 and 3, X includes only test year and quarter fixed effects. Appendix Tables A4 and A5 present estimates with a vector of covariates X that adds controls for gender, race, native language, receipt of public assistance at ABE enrollment, employment status at ABE enrollment, and indicators for missing data for each demographic variable in addition to test year and quarter fixed effects. The coefficient α_{1j} identifies the discontinuity in $PassEver_{ij}$ at the threshold.

Similarly, we can model the relationship between our college outcomes of interest and GED score at the threshold using the same model, but replacing the dependent variable with college outcomes, Y_{ij}:

$$\begin{aligned} Y_{ij} =& \beta_{0j} + \beta_{1j} Above_{ij} + \sum_{d=1}^{D} \beta_{bjd} [Below_{ij}(Subscore_{ij} - Cutscore_j)]^d \\ &+ \sum_{d=1}^{D} \beta_{ajd} [Above_{ij}(Subscore_{ij} - Cutscore_j)]^d + \beta_{2j} X + \upsilon_{ij} \end{aligned} \tag{2}$$

The coefficient β_{1j} can be thought of as something like an intent to treat estimate of crossing the passing threshold on one's first GED attempt on college outcomes. Figures 3a-3d presents a graphical representation of this relationship in each RD sample. The Wald estimator, τ_j, that estimates the impact of actually receiving a GED on college outcomes is the ratio of β_{1j} to α_{1j}:

$$\tau_j = \beta_{1j} / \alpha_{1j} \tag{3}$$

We can reformulate the fuzzy RD specification in an instrumental variables (IV) framework (Hahn, Todd, and Van der Klaauw 2001; Imbens & Lemieux 2008; JMT 2016). To generate 2SLS estimates of the impact of earning a GED on college outcomes, we estimate the predicted value of $PassEver_{ij}$ from equation 1 and use this predicted value to estimate equation 4 below for each dimension j. Once $\widehat{PassEver}_{ij}$ is the estimated from the predicted values in equation 1, we estimate the causal impact of earning a GED on college outcomes from:

[15] See below for an explanation of the construction of the Multi RD sample.

$$
\begin{aligned}
Y_{ij} =& \gamma_{0j} + \tau_j \widehat{PassEver}_{ij} + \sum_{d=1}^{D} \gamma_{bjd} [Below_{ij}(Subscore_{ij} - Cutscore_j)]^d \\
&+ \sum_{d=1}^{D} \gamma_{ajd} [Above_{ij}(Subscore_{ij} - Cutscore_j)]^d + \gamma_{2j} X + \epsilon_{ij}
\end{aligned} \tag{4}
$$

Importantly, all independent variables other than the predicted value $\widehat{PassEver}_{ij}$ enter the first and second stage of the 2SLS regression exactly as in equations 1 and 2, so the coefficients τ_j in equations 3 and 4 are numerically identical and identify the local impact of earning a GED by crossing the passing threshold along dimension j.

For the multi-subject RD, we calculate an individual's distance from the passing threshold along any dimension j that represents a single binding constraint determining whether or not they pass the GED and calculate a distance-from-passing measure $Dist_{ij}$ that is non-negative for individuals who meet or exceed the minimum passing score along that dimension and negative for individuals who do not. Individuals who do not face a binding constraint along dimension j are assigned a missing value for $Dist_{ij}$, and individuals who do not face any single binding constraint (e.g. they fail multiple subtests) are assigned a missing value for all $Dist_{ij}$. For individuals who fail the GED on their first attempt, it is only possible to have at most one binding constraint along any dimension j, but for individuals who pass the GED on their first attempt, their scores on all dimensions j represent binding constraints. Therefore, we take the minimum of each individual's non-missing values of $Dist_{ij}$, $j \in$ {Math, Reading, Writing, Science, Social Science, Total Score} to calculate a subject-neutral distance to passing measure $MinDist_i$ that is non-missing for all individuals who either passed the GED on their first attempt or failed the GED on their first attempt and faced a binding constraint along some single dimension j. We will call this sample of individuals the "Multi RD" sample. To calculate the impact of earning a GED on college outcomes for the Multi RD sample, we estimate each equation 1-4, but with $MinDist_i$, the subject-neutral distance from passing, replacing $(Subscore_{ij} - Cutscore_{ij})$:

$$PassEver_{iM} = \alpha_{0M} + \alpha_{1M} Above_{iM} + \sum_{d=1}^{D} \alpha_{bMd} [Below_{iM}(MinDist_i)]^d + \sum_{d=1}^{D} \alpha_{aMd} [Above_{iM}(MinDist_i)]^d + \alpha_{2M} X + \mu_{iM} \quad (1M)$$

$$Y_{iM} = \beta_{0M} + \beta_{1M} Above_{iM} + \sum_{d=1}^{D} \beta_{bMd} [Below_{iM}(MinDist_i)]^d + \sum_{d=1}^{D} \beta_{aMd} [Above_{iM}(MinDist_i)]^d + \beta_{2M} X + \upsilon_{iM} \quad (2M)$$

$$\tau_M = \beta_{1M} / \alpha_{1M} \quad (3M)$$

$$Y_{iM} = \gamma_{0M} + \tau_j \widehat{PassEver} + \sum_{d=1}^{D} \gamma_{bMd} [Below_{iM}(MinDist_i)]^d + \sum_{d=1}^{D} \gamma_{aMd} [Above_{iM}(MinDist_i)]^d + \gamma_{2M} X + \epsilon_{iM} \quad (4M)$$

To provide evidence of the validity of our RD design, we run a placebo test to determine whether there are any unexpected discontinuities in observable characteristics at the passing threshold for each demographic characteristic in each RD sample:

$$X_{ij} = \alpha_{x0} + \alpha_{x1} Above_{ij} + \sum_{d=1}^{4} \alpha_{xbd} [Below_{ij}(Subscore_{ij} - Cutscore_j)]^d + \sum_{d=1}^{4} \alpha_{xad} [Above_{ij}(Subscore_{ij} - Cutscore_j)]^d + \omega_{ij} \quad (5)$$

Results of these placebo tests are presented in columns 7-10 of Table 1. We follow JMT in controlling for a 4th degree polynomial in distance from the passing threshold, but results are similar for lower order polynomials as well.

5 Results

To examine the impact of the GED on college outcomes, we focus our discussion on the Multi RD and Math RD samples, as the estimates from these samples are estimated with more precision than the RD estimates from other subgroup samples. The LATE estimates from the next largest RD samples, comprised of individuals who faced binding constraints from their writing subtest score or total score, have standard errors that are generally two to four times as large as those generated from the Multi RD and Math RD samples.[16] Results from the Multi RD sample ensure that all GED completers in the ABE sample who have a binding score in any subject are included in the analysis, maximizing power and sample size while using the binding score condition to define the sample. The Math RD sample comprises the majority of individuals who failed the GED on their first attempt and faced a binding constraint along a single dimension (1,932/3,249; 59.5%). The Total Score RD sample accounts for 552 individuals (17.0%) and the Writing RD sample accounts for another 523 individuals (16.1%). The remaining individuals in the Multi RD sample who failed the GED on their first attempt faced binding constraints in Social Science (97/3,249; 3.0%), Reading (81/3,249; 2.5%), or Science (64/3,249; 2.0%). An additional 7,587 individuals passed the GED on their first attempt and by definition faced a binding constraint in all subtests, which defines the sample to the right of the threshold for all RD estimates. Estimates of the first stage impact of crossing the threshold on eventual GED credential attainment are presented in the last row of Table 1. The math subtest represents the most binding constraint for passing the GED, as crossing the passing threshold on the first attempt increases an individual's probability of ever receiving a GED by 21.9pp. Crossing the Multi RD passing threshold increases probability of earning a GED by 13.6pp.

Table 2 presents IV estimates of the impact of earning a GED credential on probability of enrolling in college during the first 16 quarters immediately following their first GED attempt. To distinguish percentage differences from percentage point differences, we abbreviate percentage point as "pp" when presenting results. We find evidence that earning a GED significantly increases an individual's probability of being enrolled in college up to six quarters after taking the test.[17] The impact of earning a GED on college enrollment peaks at 50.7pp (12.6pp)[18] during the fourth

[16] Appendix Tables A2 and A3 replicates tables 2 and 3 for the writing and total score RD samples.

[17] Note that our estimates are relatively imprecise, so we are unable to detect effects below roughly 16 percentage points, which would represent an economically meaningful impact on college going for any group, but particularly in a population with baseline rates of enrollment in the range of 25-35%.

[18] Standard errors follow LATE estimates in parentheses.

quarter after an individual's first GED attempt, more than doubling our sample's baseline rate of college enrollment. IV estimates pooled across male and female GED completers imply that earning a GED increases college enrollment 15.0pp-50.7pp during the first six quarters after taking the test. IV estimates for the pooled sample are insignificant after the 7th quarter, but uniformly positive through quarter 16. Initial enrollment impacts are particularly strong for women GED holders, who see their probability of enrolling in college increase by as much as 69.4pp (22.2pp) four quarters after their first GED attempt. Interestingly, male GED holders, whose initial increase in college enrollment is muted relative to their female counterparts, see a statistically significant increase in probability of college enrollment 15 quarters after their first GED attempt. Nearly four years after taking the GED, marginal male passers remain 21.2pp (11.7pp) more likely to be contemporaneously enrolled in college, suggesting that the GED may have a longer lasting impact on educational investment decisions for ABE students than previous studies would suggest.

Table 3 examines the mechanisms underlying these increases in enrollment and directly tests whether passing the GED impacts college persistence or degree attainment. Again, we find large, significant impacts of earning a GED on measures of persistence. However, consistent with past research, we find no evidence that passing the GED increases the likelihood of earning a college degree or certificate.[19] Overall, our Multi RD LATE estimates show that GED passers are 45.3pp (17.0pp) more likely to ever enroll in college, which is entirely driven by enrollments in two-year colleges.[20] We find no evidence that earning a GED increases enrollment in four-year colleges or universities. GED passers enroll for an additional 2.90 (0.986) quarters, and are 35.6pp (13.2pp) more likely to enroll for at least 4 quarters during the first 16 quarters after their first GED attempt. While we cannot detect additional evidence of college persistence among men, women GED holders are 35.5pp (18.3pp) more likely to persist at least 6 quarters as a result of earning their GED. [21]

[19] While women who are constrained by their math subtest score are 14.1 percentage points more likely to earn a degree or certificate than women who narrowly miss out on earning a GED because of their math subtest score, this result is not robust, is based on very few data points (the baseline rate of degree completion is roughly 1.5 percent to the left of the math subtest threshold) and does not appear in the Multi RD sample. However, most estimates are positive, and even a small absolute increase in rates of degree completion would be a substantial proportional improvement for this population.

[20] Appendix Tables A6a and A7a estimate our main specifications from Table 3 in subgroups by race and initial employment status. We find little heterogeneity in treatment effects by race, although persistence effects may be driven by non-white test takers. As one might expect for college outcomes, we find that treatment effects are universally driven by impacts on individuals who are not employed at ABE enrollment.

[21] Note that the sample size declines slightly as we examine persistence outcomes; this is because we exclude individuals who we do not observe for at least 4, 6, or 8 quarters from the corresponding persistence estimates. Similarly, we exclude individuals who we do not observe for at least four quarters from the AA degree or certificate completion estimates, and we exclude individuals who we do not observe for all 16 quarters from the BA degree completion estimates.

Finally, we examine correlational evidence of whether ABE students are positively or negatively selected from the general GED testing population on three dimensions. First, we regress ABE status on an indicator for whether an individual retakes the GED after failing on his or her first attempt, controlling for an individual's first score on each subtest. We find that ABE students are 2.76pp (0.44pp) more likely to retake the GED conditional on their first attempt scores. Next, we examine whether ABE students are more likely to complete the GED after completing at least one subtest and find no difference in completion rates, conditional on first attempt scores, between ABE students and the general GED testing population.[22] We also find that despite being more likely to retake the test, ABE students are 3.6pp (0.45pp) less likely to eventually pass the exam after failing on their first attempt, conditional on their first attempt scores.

6 Discussion

We present strong evidence that earning a GED credential has a powerful impact on educational investments among students who self-select into public ABE classes to prepare for the test. Previous studies that do not observe GED preparation behavior have found that while earning a GED may somewhat increase rates of college enrollment, marginal passers earn few credits and do not remain in college for long (Heckman, Humphries, & Kautz 2014; JMT 2016, 2017). Our results suggest that these findings may not generalize to individuals who self-select into public GED preparation programs; within this subgroup of GED completers, marginal passers appear to be highly likely to enroll and persist in two year colleges. The magnitudes of our LATE estimates are striking; they represent nearly a tripling of college-going rates relative to the population of individuals who score just below the passing threshold on their first GED attempt. ABE students appear to be far more likely to pursue a GED credential with the goal of accessing postsecondary education than previous evidence drawn from the general GED testing pool would suggest.

ABE students represent an important subgroup from a policy perspective, as they receive a significant portion of public investment in the GED. While the average GED test-taker may study independently or enroll in a private class to prepare for the test, ABE students are enrolled in taxpayer-funded test preparation. When policy makers consider whether to dedicate resources to promote GED certification, this is the primary population those resources benefit. Our findings of large increases in rates of college enrollment and persistance but no increase in rates of degree

[22]Estimates of the correlation between ABE participation and GED completion range from -0.09pp (0.08pp) in the full population to 0.19pp (0.14pp) in the population of GED testers who do not pass on their first attempt.

attainment among marginal GED passers suggest that while the GED is opening new pathways for ABE students, these students may need additional support to reach their academic goals. Among GED-holding ABE students who enroll in college, the typical student enrolls for several quarters, but does not graduate with a degree or certificate. It is unclear whether the investment of time and money in completing some college, usually at a two-year college, without a degree has a positive return on investment for these students. Further research is required to understand the labor market returns to some college – and by extension, to the educational impacts of earning a GED – for ABE students.

Bedard (2001) presents a signalling model whereby increased access to college erodes the quality of the signal of a high school diploma and pushes some students to drop out of high school. It is feasible that Bedard's stylized signalling story plays some role in student sorting into educational attainment groups, but her analysis does not account for the ability of dropouts to reengage with higher education through the GED as their perceived costs and benefits change (particularly if schooling builds human capital in addition to signalling ability). ABE students are significantly older than the typical dropout, and may represent a subgroup of dropouts whose disutility or psychic costs of classroom education has diminished enough that they recognize positive returns to pursuing additional schooling. Individuals who were driven away from the traditional education system in their youth and join ABE demonstrate a renewed commitment to classroom learning in pursuit of their GED credential that appears to carry them into higher education.

Additionally, our analysis examines individuals who enrolled in ABE classes between 2008 and 2013, a significantly more recent cohort of GED testers than past work. Tyler, Murnane, and Willett (2000) examine students who took the GED in 45 states between 1980 and 1990; Tyler (2004) estimates the impact of the GED for 1995 GED testers in Florida; Lofstrom and Tyler (2008) consider 1997 GED testers in Texas; and JMT (2016) examine data from Missouri GED testers from 1995-2005. Between 2005 and 2013, fall enrollment in degree granting postsecondary institutions in the U.S. rose 16.5% (U.S. Department of Education 2016). As the labor market has continued to evolve, with fewer high-paying, low-education jobs and demand for skilled labor rising, more individuals further down the skill distribution are entering higher education (Carneiro & Lee 2011). It is possible that in our sample, more dropouts who would have forgone further education in the past, and perhaps found labor market success in shrinking high-wage/low-education industries, may be driven back to the GED to gain access to postsecondary training. Autor (2014) notes that the rising college wage premium is driven both by the increasing returns to skill and the decline

in real wages of low-education workers, which could provide additional motivation for dropouts to pursue GED credentials as a pathway to college in recent years.

While we hypothesize that characteristics of the self-selected ABE population explain at least some portion of the stark difference the magnitude of the GED's impact on educational attainment in our sample versus previous studies, we are unable to observe college outcomes for non-ABE GED completers, so we cannot test this hypothesis directly. Is it also feasible that some of the difference in impacts could be attributable to the characteristics of the college and labor market landscapes in Massachusetts relative to other states where returns to the GED have been measured.

While our results suggest that educational attainment could play a significant role in mediating the benefits of earning a GED, at least in particular contexts or subgroups of GED completers, there are many open questions related to the GED in Massachusetts. In future research, we plan to extend our anaylsis to include labor market and civic outcomes for ABE students. Additionally, we plan to conduct a parallel analysis for non-ABE dropouts in Massachusetts to directly test the differences in returns to the GED for ABE and non-ABE students. Larger administrative datasets, like those used for past RD analyses, could also examine whether different subtest cutoffs, which identify LATE parameters at different parts of the skill distribution in Massachusetts, reveal heterogeneity in returns to the GED at different points of the skill distribution in the overall GED testing population in Massachusetts or elsewhere.

Even if Heckman and Rubinstein (2001) are correct that, on average, "GED's are 'wise guys' who lack the abilities to think ahead, persist in tasks, or to adapt to environments,"[23] our results provide evidence that the students who provide the exception to the rule effectively self-sort into the publicly subsidized GED preparation courses that represent a significant portion of public investment in HSE credentials. As such, we should not necessarily be alarmed that the mixed signal the GED sends to the labor market is not generating large returns for marginal GED passer in the overall population. If ABE students increased access to postsecondary education translates to similar labor market benefits, public investments in the GED may have large returns even if the GED remains on average a mixed signal.

[23] We view this characterization of GED holders as unsubstantiated and unnecessarily pejorative.

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Figure 1a: Density Plot of GED Test Scores, Multi RD Sample. Note that scores are rescaled in increments of one instead of ten, so -20=-200, 40=400, etc.

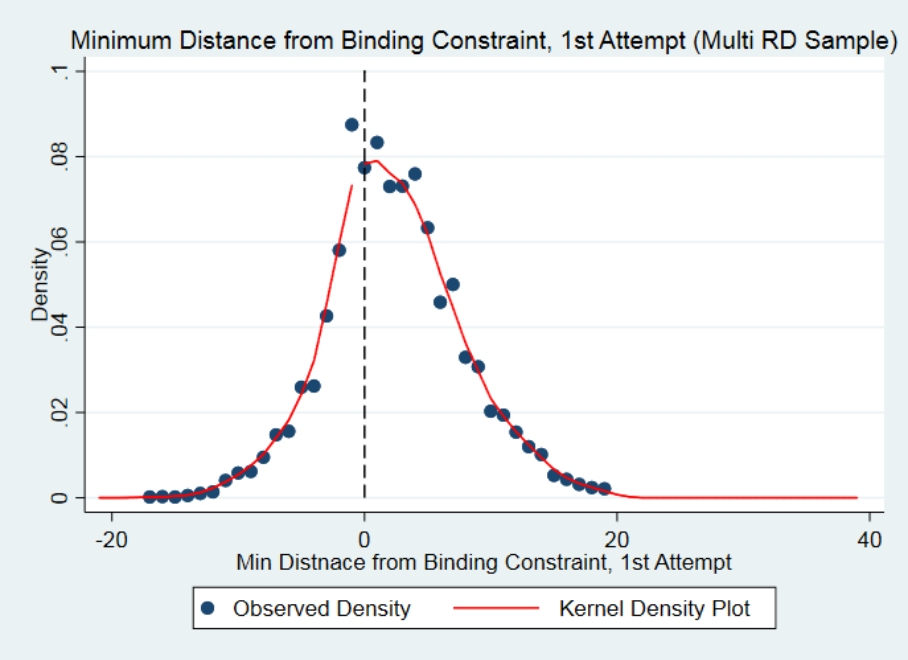

Figure 1b: Density Plot of GED Test Scores, Math RD Sample. Note that scores are rescaled in increments of one instead of ten, so 20=200, 40=400, etc.

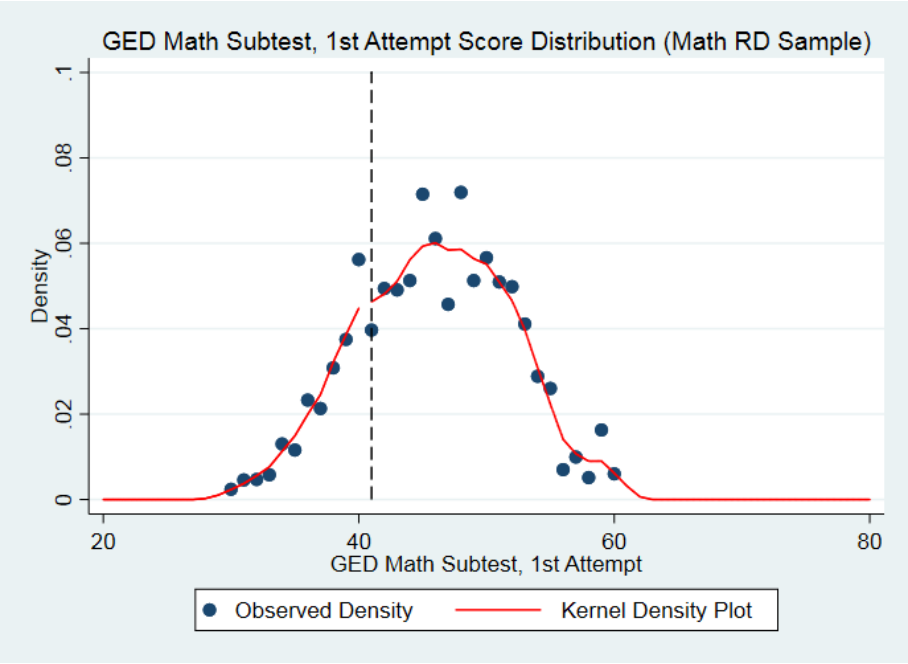

Figure 1c: Density Plot of GED Test Scores, Writing RD Sample. Note that scores are rescaled in increments of one instead of ten, so 20=200, 40=400, etc.

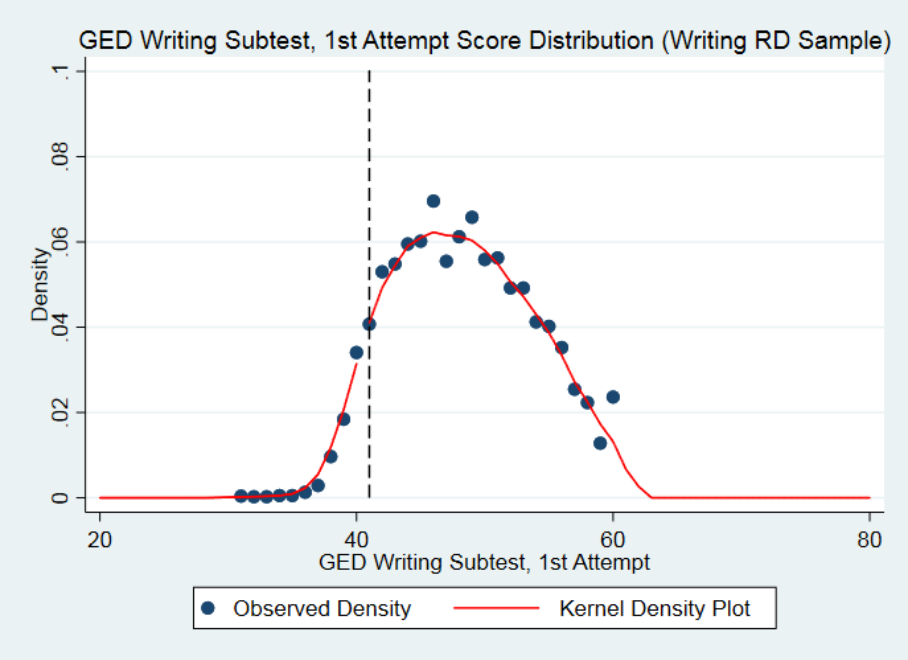

Figure 1d: Density Plot of GED Test Scores, Total RD Sample. Note that scores are rescaled in increments of one instead of ten, so 220=2200, 240=2400, etc.

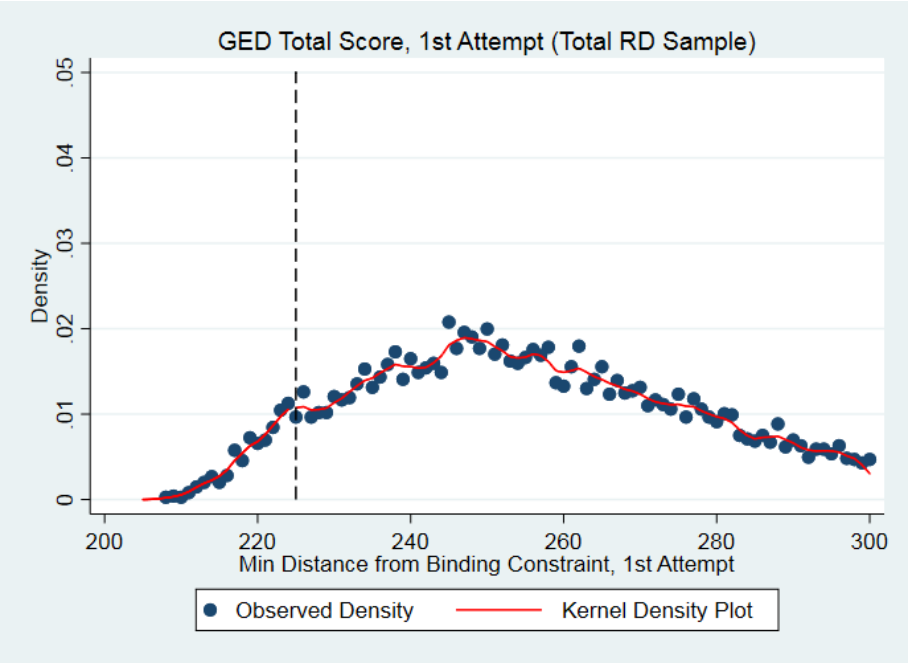

Figure 2a: First Stage relationship between distance from passing threshold after first GED attempt and ever passing the GED, Multi RD Sample. Note that scores are rescaled in increments of one instead of ten, so -5=-50, 10=100, etc.

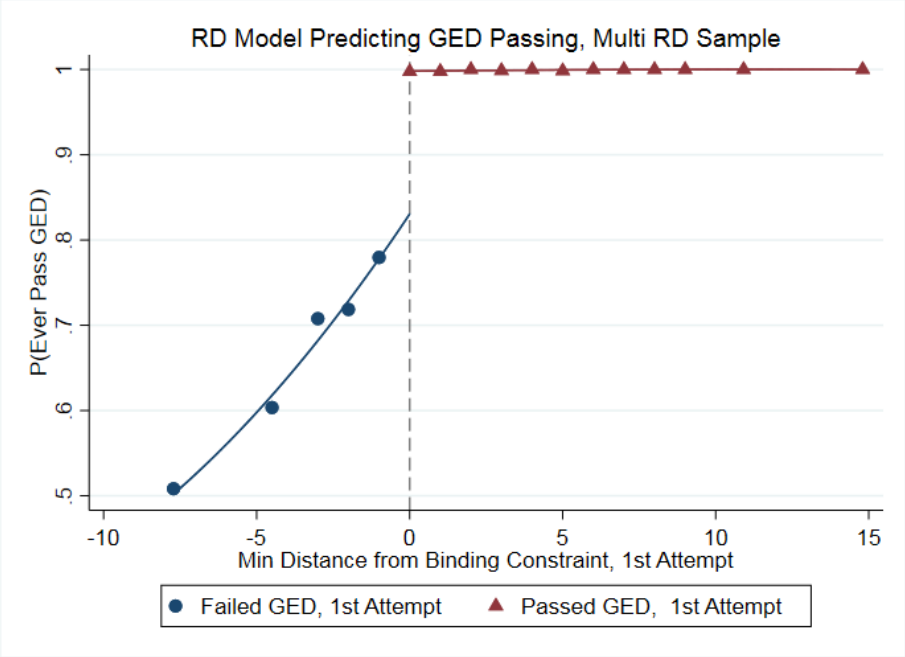

Figure 2b: First Stage relationship between first GED math subscore and ever passing the GED, Math RD Sample. Note that scores are rescaled in increments of one instead of ten, so 40=400, 45=450, etc.

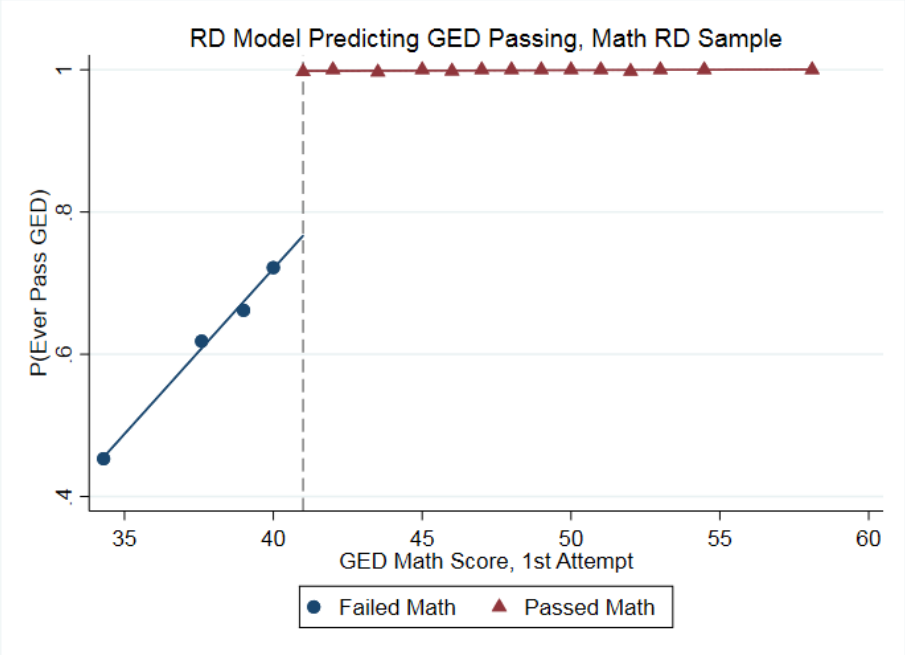

Figure 2c: First Stage relationship between first GED writing subscore and ever passing the GED, Writing RD Sample. Note that scores are rescaled in increments of one instead of ten, so 40=400, 45=450, etc.

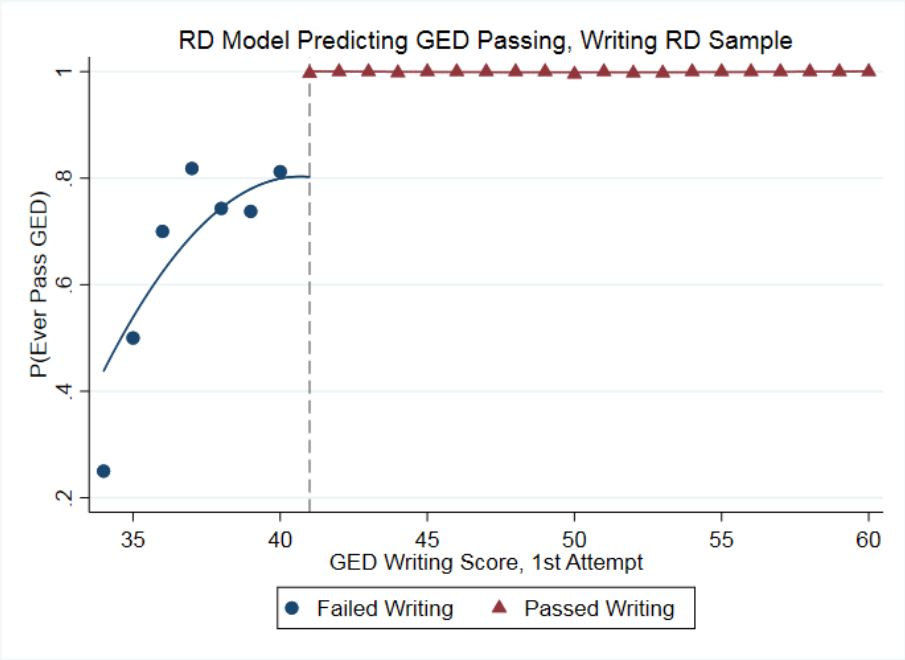

Figure 2d: First Stage relationship between first GED total score and ever passing the GED, Total Score RD Sample. Note that scores are rescaled in increments of one instead of ten, so 220=2200, 240=2400, etc.

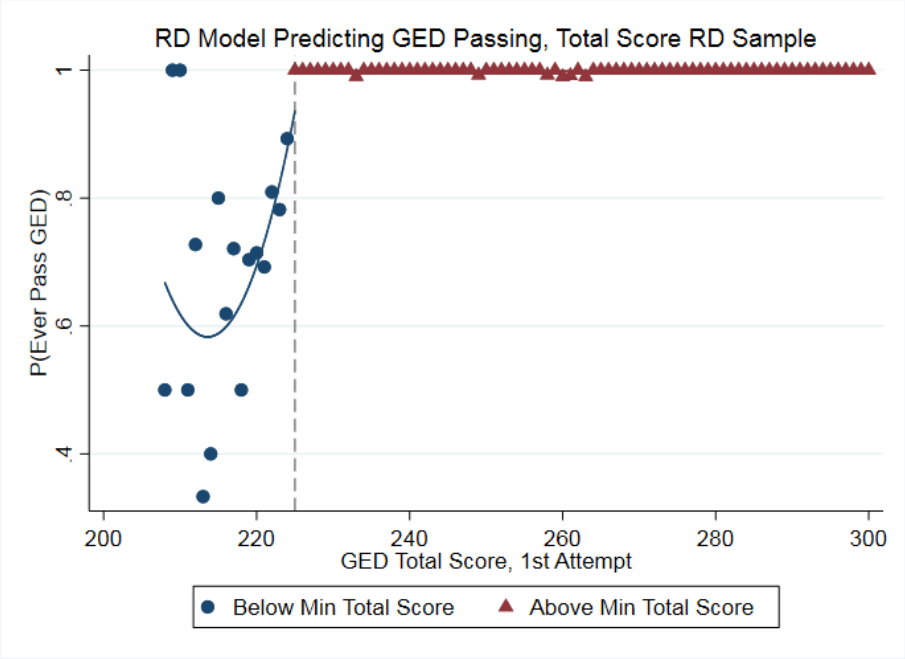

Figure 3a: Reduced form relationship between distance from passing threshold after first GED attempt and college enrollment, Multi RD Sample. Note that scores are rescaled in increments of one instead of ten, so -5=-50, 10=100, etc.

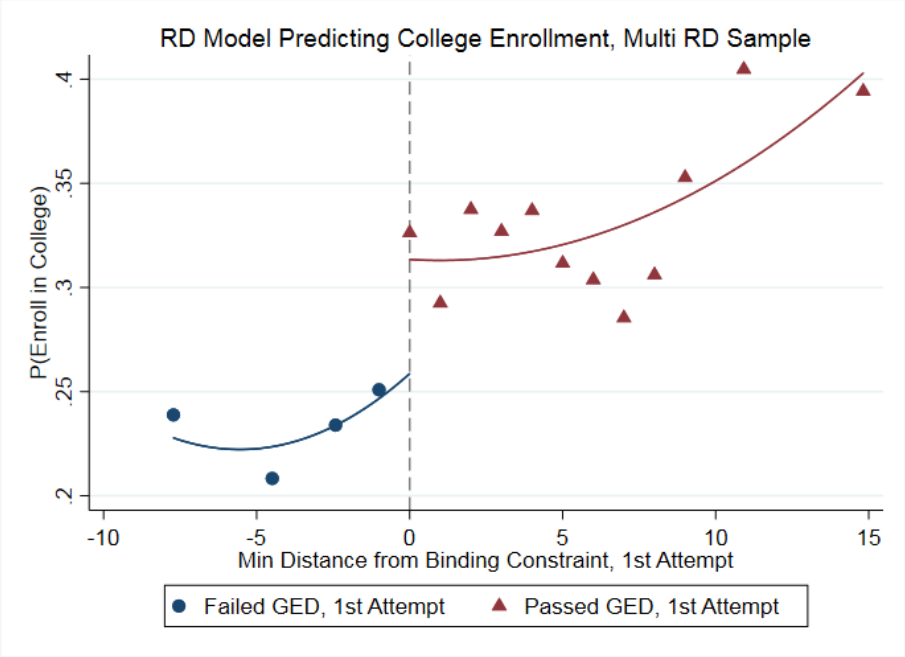

Figure 3b: Reduced form relationship between first GED math subscore and college enrollment, Math RD Sample. Note that scores are rescaled in increments of one instead of ten, so 40=400, 45=450, etc.

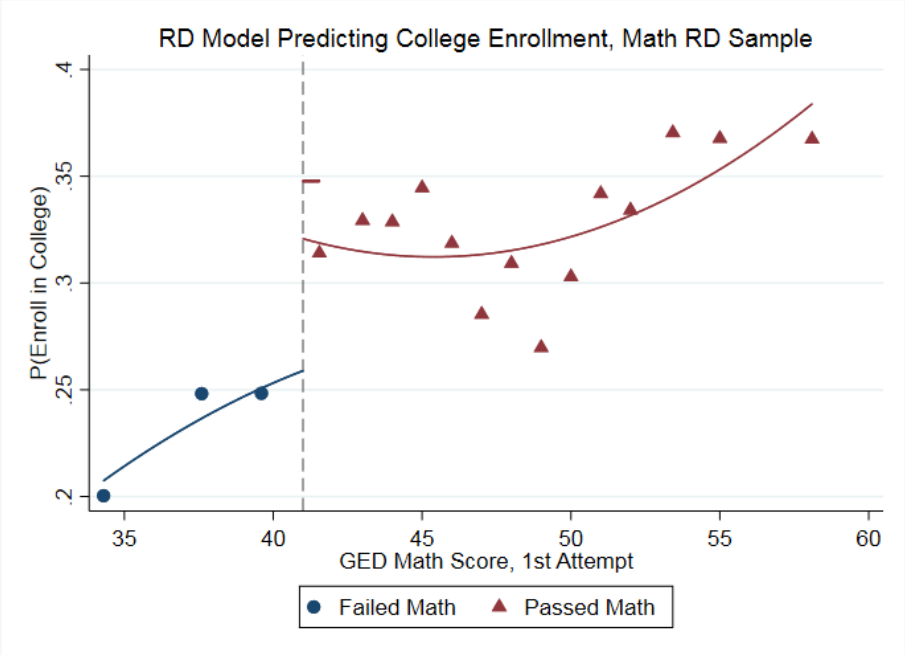

Figure 3c: Reduced form relationship between first GED writing subscore and college enrollment, Writing RD Sample. Note that scores are rescaled in increments of one instead of ten, so 40=400, 45=450, etc.

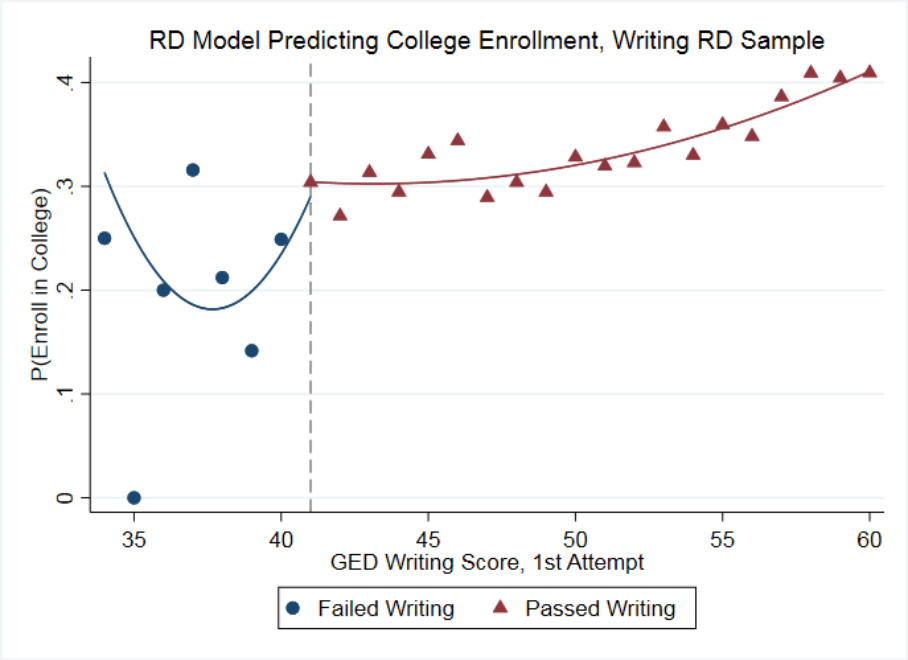

Figure 3d: Reduced form relationship between first GED total score and college enrollment, Total Score RD Sample. Note that scores are rescaled in increments of one instead of ten, so 220=2200, 240=2400, etc.

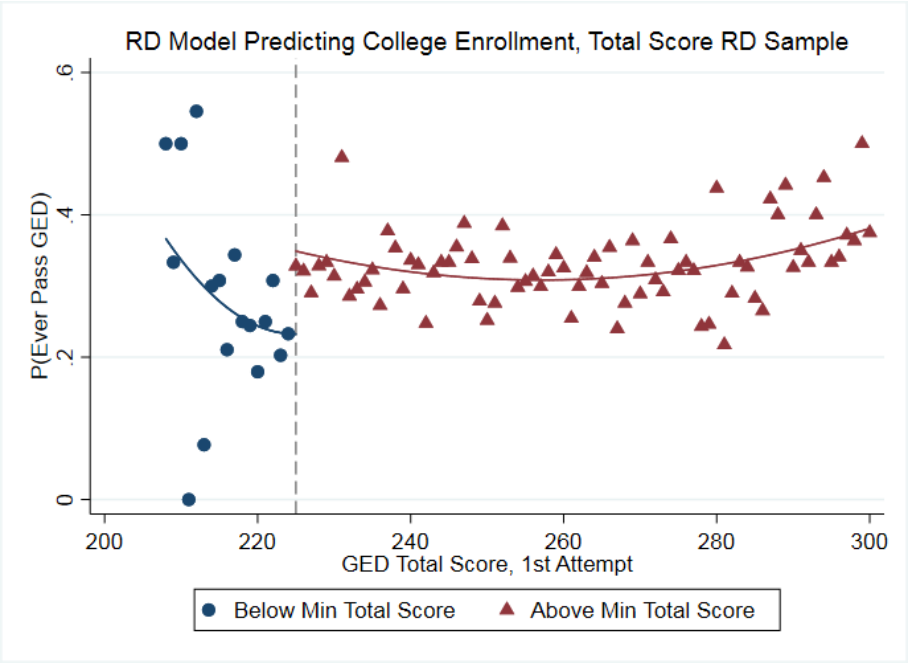

Table 1: Summary Statistics for selected groups of GED Test-Takers 2002-2013
and Discontinuities in Test Takers' Characteristics

	Summary Statistics						Multi RD Estimated Discontinuity	Math RD Estimated Discontinuity	Writing RD Estimated Discontinuity	Total RD Estimated Discontinuity
	All GED Completers	ABE Sample	Multi RD Sample	Math RD Sample	Writing RD Sample	Total RD Sample				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Age at 1st GED attempt	24.091	27.693	26.931	27.062	26.507	26.362	-1.064	-1.988	-9.160**	2.080
	(8.759)	(9.969)	(9.614)	(9.644)	(9.350)	(9.215)	(0.968)	(1.804)	(4.044)	(2.475)
Observations	102,859	17,778	9810	8309	7032	6829	9810	8309	7032	6829
Male	0.543	0.496	0.546	0.529	0.596	0.560	0.001	-0.021	0.259	-0.094
	(0.498)	(0.500)	(0.498)	(0.499)	(0.491)	(0.496)	(0.050)	(0.093)	(0.209)	(0.133)
Observations	102,116	17,778	9810	8309	7032	6829	9810	8309	7032	6829
Non-White	0.444	0.527	0.418	0.413	0.383	0.408	0.057	0.027	-0.003	0.196
	(0.497)	(0.499)	(0.493)	(0.492)	(0.486)	(0.491)	(0.049)	(0.092)	(0.211)	(0.129)
Observations	88,926	17,726	9788	8291	7017	6817	9788	8291	7017	6817
Native English Speaker	—	0.713	0.790	0.803	0.798	0.784	-0.004	-0.050	0.308*	0.141
		(0.453)	(0.407)	(0.398)	(0.402)	(0.411)	(0.042)	(0.077)	(0.176)	(0.109)
Observations		17,256	9578	8107	6901	6701	9578	8107	6901	6701
Receiving Public Asst	—	0.472	0.459	0.463	0.460	0.454	-0.003	0.069	-0.168	0.162
		(0.499)	(0.498)	(0.499)	(0.498)	(0.498)	(0.051)	(0.097)	(0.219)	(0.134)
Observations		17,256	9578	8107	6901	6701	9578	8107	6901	6701
Employed	—	0.305	0.284	0.280	0.278	0.283	-0.047	0.016	-0.287	0.077
		(0.460)	(0.451)	(0.449)	(0.448)	(0.450)	(0.046)	(0.087)	(0.197)	(0.121)
Observations		17,256	9578	8107	6901	6701	9578	8107	6901	6701
Zipcode Poverty Rate	—	16.098	14.850	14.946	14.341	14.691	0.637	-0.082	0.450	6.454**
		(9.980)	(9.492)	(9.533)	(9.207)	(9.282)	(0.983)	(1.838)	(4.141)	(2.550)
Observations		16,749	9206	7797	6583	6410	9206	7797	6583	6410
Missing NSC record	—	0.128	0.000	0.000	0.000	0.000	—	—	—	—
		(0.334)	(0.000)	(0.000)	(0.000)	(0.000)				
Observations		17,778	9810	8309	7032	6829				
Retake Test	0.340	0.486	0.293	0.221	0.114	0.118	-0.840***	-0.821***	-0.965***	-0.970***
	(0.474)	(0.500)	(0.455)	(0.415)	(0.318)	(0.323)	(0.027)	(0.050)	(0.106)	(0.065)
Observations	103,157	17,778	9810	8309	7032	6829	9810	8309	7032	6829
Ever Passed GED	0.815	0.680	0.912	0.925	0.986	0.982	0.136***	0.219***	0.114***	0.059***
	(0.388)	(0.467)	(0.283)	(0.264)	(0.118)	(0.134)	(0.012)	(0.016)	(0.014)	(0.015)
Observations	103,157	17,778	9810	8309	7032	6829	9810	8309	7032	6829

Notes: This table reports summary statistics for the subsamples of GED test completers indicated by the column headers in columns (1)-(6). Columns (7)-(10) reports discontinuities in estimates for the test-takers characteristics for the indicated subsample, whose group means are tabulated in columns (3)-(6). The Multi RD sample includes test completers who either passed the GED on their first attempt or failed their first attempt while passing 4 of the 5 substests or passing all 5 subtests, but failing to attain the minimum passing total score (2250). The Math (Writing) RD sample includes test-completers whose first attempt math (writing) subtest score was a binding constraint determining whether they passed the GED on their first attempt. This includes test takers who pass on their first attempt as well as all individuals who completed and passed all other subtests and achieved a high enough score that earning the minimum passing score (410) in math (writing) would be sufficient to reach the minimum passing total score (2250). The Total RD sample includes test completers who either passed the GED on their first attempt or failed their first attempt while passing all 5 subtests, but failing to attain the minimum passing total score (225). All RD samples are limited to individuals who match to NSC records (i.e. we observe an attempt to measure their enrollment status) and who score between 300-600 on their binding subtest or between 2050-3000 if their total score was binding.Standard deviations (for sample means) and standard errors (for estimates) are in parentheses.
* Significant at the 10 percent level.
** Significant at the 5 percent level.
*** Significant at the 1 percent level.

Table 2: Estimated Impact of Earning a GED on Postsecondary Enrollment by Quarter

	Full Multi RD Sample		Men		Women	
Quarters since	Coefficient	Observations	Coefficient	Observations	Coefficient	Observations
1st GED Test	(1)	(2)	(3)	(4)	(5)	(6)
1	0.280 (0.120)**	9041	0.299 (0.136)**	4965	0.242 (0.202)	4076
2	0.319 (0.126)**	9129	0.146 (0.140)	5010	0.526 (0.219)**	4119
3	0.418 (0.132)***	9207	0.211 (0.147)	5045	0.654 (0.226)***	4162
4	0.507 (0.126)***	9272	0.328 (0.136)**	5081	0.694 (0.222)***	4191
5	0.314 (0.119)***	9305	0.290 (0.130)**	5095	0.305 (0.205)	4210
6	0.150 (0.111)	9339	0.085 (0.121)	5109	0.218 (0.195)	4230
7	0.196 (0.109)*	9368	0.208 (0.121)*	5126	0.170 (0.189)	4242
8	0.122 (0.102)	9396	0.167 (0.111)	5138	0.057 (0.178)	4258
9	0.003 (0.113)	8901	0.057 (0.126)	4881	-0.067 (0.189)	4020
10	0.057 (0.103)	8710	0.148 (0.125)	4766	-0.048 (0.162)	3944
11	0.013 (0.110)	8228	-0.045 (0.125)	4526	0.069 (0.180)	3702
12	0.055 (0.110)	7967	0.035 (0.134)	4371	0.052 (0.169)	3596
13	0.090 (0.114)	7741	0.025 (0.136)	4254	0.126 (0.179)	3487
14	0.012 (0.099)	7631	0.130 (0.119)	4190	-0.093 (0.156)	3441
15	0.070 (0.100)	7341	0.212 (0.117)*	4021	-0.087 (0.162)	3320
16	0.075 (0.093)	7047	0.081 (0.109)	3854	0.035 (0.147)	3193

	Full Math RD Sample		Men		Women	
Quarters since	Coefficient	Observations	Coefficient	Observations	Coefficient	Observations
1st GED Test	(1)	(2)	(3)	(4)	(5)	(6)
1	0.093 (0.116)	7716	0.001 (0.153)	4122	0.170 (0.171)	3594
2	0.308 (0.124)**	7788	0.109 (0.162)	4157	0.471 (0.186)**	3631
3	0.422 (0.128)***	7850	0.117 (0.169)	4182	0.666 (0.191)***	3668
4	0.467 (0.120)***	7897	0.139 (0.149)	4204	0.739 (0.191)***	3693
5	0.288 (0.115)**	7927	0.128 (0.144)	4216	0.419 (0.178)**	3711
6	0.144 (0.107)	7952	0.019 (0.133)	4225	0.241 (0.165)	3727
7	0.130 (0.103)	7976	-0.118 (0.130)	4239	0.349 (0.161)**	3737
8	0.032 (0.097)	8000	-0.108 (0.120)	4247	0.171 (0.151)	3753
9	-0.052 (0.099)	7576	-0.023 (0.128)	4035	-0.057 (0.149)	3541
10	0.023 (0.089)	7412	-0.022 (0.118)	3935	0.079 (0.131)	3477
11	-0.045 (0.090)	7018	-0.178 (0.111)	3745	0.066 (0.140)	3273
12	0.029 (0.090)	6794	-0.035 (0.121)	3615	0.066 (0.132)	3179
13	-0.061 (0.094)	6603	-0.138 (0.127)	3518	-0.025 (0.138)	3085
14	-0.056 (0.082)	6506	-0.010 (0.109)	3463	-0.087 (0.120)	3043
15	-0.058 (0.079)	6259	0.057 (0.106)	3322	-0.130 (0.117)	2937
16	-0.008 (0.073)	6000	-0.031 (0.101)	3175	-0.008 (0.104)	2825

Notes: This table reports Regression Discontinuity estimates of the impact of earning a GED on postsecondary enrollment by quarter for members of the indicated subgroups. The Multi RD sample includes all test completers who either passed the GED on their first attempt or failed their first attempt while passing 4 of the 5 substests or passing all 5 subtests, but failing to attain the minimum passing total score (2250). The Math RD sample includes all test-completers whose first attempt math subtest score was a binding constraint determining whether they passed the GED on their first attempt. This includes all test takers who pass on their first attempt as well as all individuals who completed and passed all other subtests and achieved a high enough score that earning the minimum passing score in math (410) would be sufficient to reach the minimum total passing score (2250). Standard errors are in parentheses.

* Significant at the 10 percent level.

** Significant at the 5 percent level.

*** Significant at the 1 percent level.

Table 3: Estimated Impact of Earning a GED
on Postsecondary Enrollment, Persistence, and Degree Attainment

	Multi RD Sample			Math RD Sample		
	Pooled	Men	Women	Pooled	Men	Women
	(1)	(2)	(3)	(4)	(5)	(6)
Ever Enrolled in College	0.453***	0.503**	0.332	0.332**	0.315	0.358
	(0.170)	(0.198)	(0.275)	(0.153)	(0.204)	(0.219)
Observations	9810	5353	4457	8309	4396	3913
Ever Enrolled (2 year)	0.463***	0.508***	0.359	0.342**	0.361*	0.354
	(0.167)	(0.192)	(0.273)	(0.149)	(0.197)	(0.217)
Observations	9810	5353	4457	8309	4396	3913
Ever Enrolled (4 year)	0.013	0.040	-0.048	-0.051	-0.116	-0.006
	(0.076)	(0.090)	(0.125)	(0.068)	(0.095)	(0.098)
Observations	9810	5353	4457	8309	4396	3913
Quarters Enrolled	2.901***	2.435**	3.174*	1.691*	0.168	3.055**
	(0.986)	(1.027)	(1.748)	(0.877)	(1.047)	(1.382)
Observations	9810	5353	4457	8309	4396	3913
Enrolled 4+ Quarters	0.356***	0.354**	0.319	0.267**	0.061	0.431**
	(0.132)	(0.145)	(0.226)	(0.125)	(0.158)	(0.189)
Observations	9497	5191	4306	8076	4282	3794
Enrolled 6+ Quarters	0.246**	0.145	0.355*	0.211**	-0.039	0.416***
	(0.101)	(0.103)	(0.183)	(0.094)	(0.112)	(0.151)
Observations	9460	5171	4289	8046	4268	3778
Enrolled 8+ Quarters	0.164**	0.106	0.228	0.056	-0.053	0.156
	(0.081)	(0.081)	(0.149)	(0.075)	(0.086)	(0.120)
Observations	9408	5145	4263	8010	4254	3756
Earned Degree or Certificate	0.036	0.025	0.055	0.043	-0.066	0.141*
	(0.054)	(0.049)	(0.104)	(0.050)	(0.053)	(0.085)
Observations	9494	5190	4304	8073	4281	3792
Earned Degree (AA) or Certificate	0.004	0.007	0.001	0.028	-0.041	0.094
	(0.048)	(0.038)	(0.098)	(0.045)	(0.042)	(0.079)
Observations	9494	5190	4304	8073	4281	3792
Earned Degree (BA+)	0.042	0.024	0.070	0.010	-0.049	0.047
	(0.038)	(0.050)	(0.056)	(0.029)	(0.044)	(0.041)
Observations	6579	3628	2951	5634	3019	2615

Notes: This table reports Regression Discontinuity estimates of the impact of earning a GED on the outcomes indicated in each row for members of the indicated subgroups. Quarters Enrolled is calculated for the first 16 quarters (4 years) following an individual's first GED attempt. The Multi RD sample includes test completers who either passed the GED on their first attempt or failed their first attempt while passing 4 of the 5 substests or passing all 5 subtests, but failing to attain the minimum passing total score (2250). The Math RD sample includes test-completers whose first attempt math subtest score was a binding constraint determining whether they passed the GED on their first attempt. This includes test takers who pass on their first attempt as well as all individuals who completed and passed all other subtests and achieved a high enough score that earning the minimum passing score in math (410) would be sufficient to reach the minimum total passing score (2250). Standard errors are in parentheses.

* Significant at the 10 percent level.

** Significant at the 5 percent level.

*** Significant at the 1 percent level.

Table A1: Summary Statistics for selected groups of GED Test-Takers 2002-2013
and Discontinuities in Test Takers' Characteristics

	Summary Statistics						Multi RD Estimated Discontinuity	Math RD Estimated Discontinuity	Writing RD Estimated Discontinuity	Total RD Estimated Discontinuity
	All GED Completers	ABE Sample	Multi RD Sample	Math RD Sample	Writing RD Sample	Total RD Sample				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Age at 1st GED attempt	24.091	27.693	27.138	27.246	26.655	26.500	-0.818	-2.397	-9.220**	2.859
	(8.759)	(9.969)	(9.621)	(9.649)	(9.343)	(9.199)	(0.910)	(1.686)	(3.799)	(2.301)
Observations	102,859	17,778	10,836	9147	7661	7460	10,836	9147	7661	7460
Male	0.543	0.496	0.544	0.529	0.598	0.561	0.012	-0.062	0.235	-0.016
	(0.498)	(0.500)	(0.498)	(0.499)	(0.490)	(0.496)	(0.047)	(0.087)	(0.197)	(0.124)
Observations	102,116	17,778	10,836	9147	7661	7460	10,836	9147	7661	7460
Non-White	0.444	0.527	0.426	0.419	0.388	0.413	0.032	0.012	0.020	0.162
	(0.497)	(0.499)	(0.495)	(0.493)	(0.487)	(0.492)	(0.046)	(0.086)	(0.199)	(0.120)
Observations	88,926	17,726	10,809	9125	7646	7447	10,809	9125	7646	7447
Native English Speaker	—	0.713	0.785	0.800	0.795	0.781	-0.009	-0.022	0.150	0.083
		(0.453)	(0.410)	(0.400)	(0.404)	(0.413)	(0.039)	(0.072)	(0.166)	(0.102)
Observations		17,256	10,578	8925	7520	7325	10,578	8925	7520	7325
Receiving Public Asst	—	0.472	0.463	0.467	0.463	0.457	0.006	0.099	-0.078	0.139
		(0.499)	(0.499)	(0.499)	(0.499)	(0.498)	(0.048)	(0.090)	(0.206)	(0.125)
Observations		17,256	10,578	8925	7520	7325	10,578	8925	7520	7325
Employed	—	0.305	0.284	0.280	0.278	0.282	-0.039	0.002	-0.210	0.105
		(0.460)	(0.451)	(0.449)	(0.448)	(0.450)	(0.044)	(0.081)	(0.185)	(0.113)
Observations		17,256	10,578	8925	7520	7325	10,578	8925	7520	7325
Zipcode Poverty Rate	—	16.098	14.930	15.010	14.402	14.744	0.515	-0.782	1.796	5.875**
		(9.980)	(9.524)	(9.556)	(9.229)	(9.305)	(0.928)	(1.726)	(3.911)	(2.388)
Observations		16,749	10,167	8586	7179	7004	10,167	8586	7179	7004
Missing NSC record	—	0.128	0.095	0.092	0.082	0.085	0.002	0.070	0.090	-0.018
		(0.334)	(0.293)	(0.288)	(0.275)	(0.278)	(0.028)	(0.051)	(0.112)	(0.069)
Observations		17,778	10,836	9147	7661	7460	10,836	9147	7661	7460
Retake Test	0.340	0.486	0.303	0.230	0.118	0.123	-0.844***	-0.828***	-0.982***	-0.970***
	(0.474)	(0.500)	(0.459)	(0.421)	(0.322)	(0.329)	(0.026)	(0.048)	(0.102)	(0.062)
Observations	103,157	17,778	10,836	9147	7661	7460	10,836	9147	7661	7460
Ever Passed GED	0.815	0.680	0.902	0.915	0.984	0.979	0.147***	0.232***	0.125***	0.066***
	(0.388)	(0.467)	(0.298)	(0.278)	(0.126)	(0.144)	(0.012)	(0.015)	(0.014)	(0.014)
Observations	103,157	17,778	10,836	9147	7661	7460	10,836	9147	7661	7460

Notes: This table reports summary statistics for the subsamples of GED test completers indicated by the column headers in columns (1)-(6). Columns (7)-(10) reports discontinuities in estimates for the test-takers characteristics for the indicated subsample, whose group means are tabulated in columns (3)-(6). The Multi RD sample includes test completers who either passed the GED on their first attempt or failed their first attempt while passing 4 of the 5 substests or passing all 5 subtests, but failing to attain the minimum passing total score (2250). The Math (Writing) RD sample includes test-completers whose first attempt math (writing) subtest score was a binding constraint determining whether they passed the GED on their first attempt. This includes test takers who pass on their first attempt as well as all individuals who completed and passed all other subtests and achieved a high enough score that earning the minimum passing score (410) in math (writing) would be sufficient to reach the minimum passing total score (2250). The Total RD sample includes test completers who either passed the GED on their first attempt or failed their first attempt while passing all 5 subtests, but failing to attain the minimum passing total score (225). All RD samples are limited to individuals who match to NSC records (i.e. we observe an attempt to measure their enrollment status) and who score between 300-600 on their binding subtest or between 2050-3000 if their total score was binding.Standard deviations (for sample means) and standard errors (for estimates) are in parentheses.
* Significant at the 10 percent level.
** Significant at the 5 percent level.
*** Significant at the 1 percent level.

Table A2: Estimated Impact of Earning a GED on Postsecondary Enrollment by Quarter

	Full Writing RD Sample		Men		Women	
Quarters since	Coefficient	Observations	Coefficient	Observations	Coefficient	Observations
1st GED Test	(1)	(2)	(3)	(4)	(5)	(6)
1	0.409 (0.352)	6695	0.595 (0.310)*	3982	-0.186 (0.620)	2713
2	-0.205 (0.371)	6740	0.053 (0.319)	4004	-0.065 (0.665)	2736
3	-0.105 (0.395)	6782	0.206 (0.336)	4024	-0.084 (0.712)	2758
4	-0.039 (0.402)	6809	0.100 (0.374)	4041	-0.286 (0.667)	2768
5	0.092 (0.383)	6825	0.611 (0.363)*	4050	-0.830 (0.657)	2775
6	-0.304 (0.370)	6843	0.127 (0.337)	4059	-0.764 (0.619)	2784
7	0.050 (0.383)	6855	0.619 (0.375)*	4066	-0.760 (0.597)	2789
8	0.310 (0.372)	6866	0.507 (0.379)	4074	-0.254 (0.554)	2792
9	0.005 (0.467)	6526	-0.233 (0.544)	3879	0.149 (0.518)	2647
10	-0.156 (0.472)	6395	-0.345 (0.528)	3793	-0.041 (0.559)	2602
11	0.293 (0.658)	6038	0.457 (0.805)	3606	0.229 (0.833)	2432
12	0.000 (0.663)	5820	0.202 (0.834)	3469	0.458 (0.758)	2351
13	0.173 (0.630)	5649	0.607 (0.803)	3373	0.382 (0.765)	2276
14	-0.008 (0.523)	5570	0.177 (0.621)	3322	-0.024 (0.637)	2248
15	0.364 (0.499)	5353	0.141 (0.522)	3191	1.662 (0.875)*	2162
16	0.275 (0.540)	5125	0.166 (0.503)	3055	1.328 (1.341)	2070

	Full Total RD Sample		Men		Women	
Quarters since	Coefficient	Observations	Coefficient	Observations	Coefficient	Observations
1st GED Test	(1)	(2)	(3)	(4)	(5)	(6)
1	0.957 (0.636)	6484	0.418 (0.834)	3635	1.363 (0.992)	2849
2	0.604 (0.633)	6533	0.180 (0.798)	3662	0.895 (1.010)	2871
3	0.479 (0.667)	6580	0.251 (0.764)	3683	0.669 (1.118)	2897
4	1.073 (0.674)	6605	1.315 (0.728)*	3698	0.648 (1.188)	2907
5	0.788 (0.637)	6618	0.949 (0.677)	3704	0.370 (1.140)	2914
6	0.696 (0.578)	6633	0.618 (0.578)	3711	0.546 (1.079)	2922
7	0.821 (0.550)	6643	1.014 (0.595)*	3715	0.393 (0.954)	2928
8	0.651 (0.506)	6650	0.738 (0.537)	3719	0.330 (0.886)	2931
9	0.343 (0.636)	6294	0.050 (0.604)	3531	0.541 (1.175)	2763
10	0.507 (0.575)	6156	0.441 (0.713)	3444	0.415 (0.832)	2712
11	0.883 (0.567)	5799	0.826 (0.714)	3272	0.703 (0.803)	2527
12	0.604 (0.435)	5597	0.286 (0.496)	3152	0.710 (0.741)	2445
13	1.111 (0.528)**	5427	0.600 (0.549)	3060	1.455 (0.999)	2367
14	0.333 (0.419)	5355	0.257 (0.476)	3013	0.334 (0.738)	2342
15	0.420 (0.498)	5147	0.308 (0.470)	2898	0.372 (1.130)	2249
16	0.300 (0.410)	4930	-0.071 (0.356)	2776	0.946 (1.165)	2154

Notes: This table reports Regression Discontinuity estimates of the impact of earning a GED on postsecondary enrollment by quarter for members of the indicated subgroups. The Writing RD sample includes all test-completers whose first attempt writing subtest score was a binding constraint determining whether they passed the GED on their first attempt. This includes all test takers who pass on their first attempt as well as all individuals who completed and passed all other subtests and achieved a high enough score that earning the minimum passing score in writing (410) would be sufficient to reach the minimum total passing score (2250). The Total RD sample includes all test completers who either passed the GED on their first attempt or failed their first attempt while passing all 5 substests, but failing to attain the minimum passing total score (2250). Standard errors are in parentheses.

* Significant at the 10 percent level.

** Significant at the 5 percent level.

*** Significant at the 1 percent level.

Table A3: Estimated Impact of Earning a GED
on Postsecondary Enrollment, Persistence, and Degree Attainment

	Writing RD Sample			Total RD Sample		
	Pooled	Men	Women	Pooled	Men	Women
	(1)	(2)	(3)	(4)	(5)	(6)
Ever Enrolled in College	0.199	0.360	-0.274	2.107*	1.569	2.993
	(0.530)	(0.552)	(0.927)	(1.085)	(0.990)	(2.973)
Observations	7032	4188	2844	6829	3821	3008
Ever Enrolled (2 year)	0.176	0.285	-0.261	2.343**	1.617*	3.620
	(0.519)	(0.534)	(0.918)	(1.095)	(0.965)	(3.210)
Observations	7032	4188	2844	6829	3821	3008
Ever Enrolled (4 year)	0.124	0.230	-0.112	-0.193	0.207	-1.195
	(0.241)	(0.258)	(0.423)	(0.447)	(0.436)	(1.354)
Observations	7032	4188	2844	6829	3821	3008
Quarters Enrolled	1.132	3.410	-1.925	11.524*	7.525	15.914
	(3.109)	(2.895)	(6.036)	(6.198)	(4.987)	(17.936)
Observations	7032	4188	2844	6829	3821	3008
Enrolled 4+ Quarters	0.211	0.563	0.144	0.777	0.721	0.589
	(0.456)	(0.462)	(0.717)	(0.580)	(0.570)	(1.132)
Observations	6907	4100	2807	6688	3739	2949
Enrolled 6+ Quarters	0.091	0.587*	-0.209	0.814	0.354	1.108
	(0.342)	(0.338)	(0.560)	(0.515)	(0.482)	(0.962)
Observations	6890	4089	2801	6672	3728	2944
Enrolled 8+ Quarters	0.102	0.401	-0.250	0.747*	0.438	0.864
	(0.297)	(0.283)	(0.462)	(0.441)	(0.385)	(0.841)
Observations	6869	4077	2792	6652	3720	2932
Earned Degree or Certificate	0.015	0.098	0.015	0.196	0.184	0.173
	(0.188)	(0.154)	(0.334)	(0.233)	(0.188)	(0.515)
Observations	6905	4099	2806	6686	3738	2948
Earned Degree (AA) or Certificate	-0.040	-0.027	0.135	0.089	0.036	0.145
	(0.166)	(0.119)	(0.310)	(0.208)	(0.142)	(0.484)
Observations	6905	4099	2806	6686	3738	2948
Earned Degree (BA+)	0.110	0.206	-0.358	0.209	0.419	0.088
	(0.180)	(0.157)	(0.422)	(0.222)	(0.401)	(0.308)
Observations	4908	2930	1978	4728	2674	2054

Notes: This table reports Regression Discontinuity estimates of the impact of earning a GED on the outcomes indicated in each row for members of the indicated subgroups. Quarters Enrolled is calculated for the first 16 quarters (4 years) following an individual's first GED attempt. The Writing RD sample includes test-completers whose first attempt writing subtest score was a binding constraint determining whether they passed the GED on their first attempt. This includes test takers who pass on their first attempt as well as all individuals who completed and passed all other subtests and achieved a high enough score that earning the minimum passing score in writing (41) would be sufficient to reach the minimum total passing score (225). The Total RD sample includes test completers who either passed the GED on their first attempt or failed their first attempt while passing all 5 subtests, but failing to attain the minimum passing total score (225). Standard errors are in parentheses.

* Significant at the 10 percent level.

** Significant at the 5 percent level.

*** Significant at the 1 percent level.

Table A4: Estimated Impact of Earning a GED on Postsecondary Enrollment by Quarter, with controls

	Full Multi RD Sample		Men		Women	
Quarters since	Coefficient	Observations	Coefficient	Observations	Coefficient	Observations
1st GED Test	(1)	(2)	(3)	(4)	(5)	(6)
1	0.264 (0.120)**	9041	0.256 (0.137)*	4965	0.214 (0.202)	4076
2	0.304 (0.126)**	9129	0.086 (0.141)	5010	0.525 (0.221)**	4119
3	0.402 (0.132)***	9207	0.160 (0.149)	5045	0.639 (0.227)***	4162
4	0.489 (0.126)***	9272	0.285 (0.138)**	5081	0.666 (0.222)***	4191
5	0.291 (0.119)**	9305	0.255 (0.133)*	5095	0.280 (0.206)	4210
6	0.125 (0.112)	9339	0.037 (0.123)	5109	0.190 (0.196)	4230
7	0.170 (0.110)	9368	0.179 (0.123)	5126	0.143 (0.190)	4242
8	0.100 (0.102)	9396	0.142 (0.113)	5138	0.032 (0.179)	4258
9	-0.019 (0.114)	8901	0.039 (0.129)	4881	-0.090 (0.190)	4020
10	0.039 (0.104)	8710	0.126 (0.128)	4766	-0.058 (0.164)	3944
11	-0.007 (0.110)	8228	-0.063 (0.127)	4526	0.060 (0.180)	3702
12	0.038 (0.110)	7967	0.017 (0.136)	4371	0.032 (0.170)	3596
13	0.073 (0.114)	7741	0.006 (0.138)	4254	0.107 (0.178)	3487
14	-0.004 (0.100)	7631	0.118 (0.121)	4190	-0.105 (0.157)	3441
15	0.058 (0.100)	7341	0.206 (0.119)*	4021	-0.091 (0.163)	3320
16	0.065 (0.093)	7047	0.071 (0.111)	3854	0.037 (0.148)	3193

	Full Math RD Sample		Men		Women	
Quarters since	Coefficient	Observations	Coefficient	Observations	Coefficient	Observations
1st GED Test	(1)	(2)	(3)	(4)	(5)	(6)
1	0.096 (0.116)	7716	-0.011 (0.153)	4122	0.165 (0.171)	3594
2	0.317 (0.123)**	7788	0.093 (0.162)	4157	0.476 (0.186)**	3631
3	0.426 (0.127)***	7850	0.094 (0.170)	4182	0.664 (0.191)***	3668
4	0.462 (0.120)***	7897	0.107 (0.150)	4204	0.730 (0.191)***	3693
5	0.279 (0.115)**	7927	0.102 (0.145)	4216	0.415 (0.178)**	3711
6	0.136 (0.107)	7952	-0.004 (0.134)	4225	0.238 (0.165)	3727
7	0.121 (0.103)	7976	-0.143 (0.132)	4239	0.348 (0.161)**	3737
8	0.023 (0.097)	8000	-0.137 (0.122)	4247	0.166 (0.151)	3753
9	-0.062 (0.099)	7576	-0.045 (0.130)	4035	-0.061 (0.148)	3541
10	0.017 (0.089)	7412	-0.042 (0.120)	3935	0.076 (0.131)	3477
11	-0.050 (0.090)	7018	-0.195 (0.113)*	3745	0.066 (0.140)	3273
12	0.021 (0.090)	6794	-0.050 (0.124)	3615	0.059 (0.132)	3179
13	-0.068 (0.095)	6603	-0.152 (0.130)	3518	-0.030 (0.138)	3085
14	-0.062 (0.082)	6506	-0.019 (0.111)	3463	-0.090 (0.121)	3043
15	-0.062 (0.079)	6259	0.046 (0.107)	3322	-0.130 (0.118)	2937
16	-0.010 (0.073)	6000	-0.042 (0.102)	3175	-0.006 (0.105)	2825

Notes: This table reports Regression Discontinuity estimates of the impact of earning a GED on postsecondary enrollment by quarter for members of the indicated subgroups. All regressions include controls for gender, race, native language, receipt of public assistance at ABE enrollment, employment status at ABE enrollment, indicators for missing data for each of the preceding controls, and indicators for year and quarter of test. The Multi RD sample includes all test completers who either passed the GED on their first attempt or failed their first attempt while passing 4 of the 5 substests or passing all 5 subtests, but failing to attain the minimum passing total score (2250). The Math RD sample includes all test-completers whose first attempt math subtest score was a binding constraint determining whether they passed the GED on their first attempt. This includes all test takers who pass on their first attempt as well as all individuals who completed and passed all other subtests and achieved a high enough score that earning the minimum passing score in math (410) would be sufficient to reach the minimum total passing score (2250). Standard errors are in parentheses.

* Significant at the 10 percent level.

** Significant at the 5 percent level.

*** Significant at the 1 percent level.

Table A5: Estimated Impact of Earning a GED
on Postsecondary Enrollment, Persistence, and Degree Attainment, with controls

	Multi RD Sample			Math RD Sample		
	Pooled	Men	Women	Pooled	Men	Women
	(1)	(2)	(3)	(4)	(5)	(6)
Ever Enrolled in College	0.392**	0.400**	0.296	0.322**	0.287	0.350
	(0.168)	(0.197)	(0.277)	(0.151)	(0.202)	(0.221)
Observations	9809	5352	4457	8308	4395	3913
Ever Enrolled (2 year)	0.406**	0.409**	0.326	0.333**	0.335*	0.350
	(0.165)	(0.191)	(0.275)	(0.148)	(0.196)	(0.219)
Observations	9809	5352	4457	8308	4395	3913
Ever Enrolled (4 year)	0.000	0.027	-0.063	-0.056	-0.127	-0.014
	(0.077)	(0.092)	(0.126)	(0.069)	(0.096)	(0.099)
Observations	9809	5352	4457	8308	4395	3913
Quarters Enrolled	2.570***	1.966*	2.927*	1.591*	-0.038	3.000**
	(0.979)	(1.024)	(1.755)	(0.870)	(1.046)	(1.394)
Observations	9809	5352	4457	8308	4395	3913
Enrolled 4+ Quarters	0.318**	0.305**	0.296	0.254**	0.032	0.425**
	(0.132)	(0.147)	(0.228)	(0.124)	(0.160)	(0.189)
Observations	9497	5191	4306	8076	4282	3794
Enrolled 6+ Quarters	0.223**	0.114	0.325*	0.201**	-0.063	0.408***
	(0.101)	(0.105)	(0.183)	(0.094)	(0.114)	(0.152)
Observations	9460	5171	4289	8046	4268	3778
Enrolled 8+ Quarters	0.152*	0.087	0.216	0.049	-0.069	0.154
	(0.082)	(0.083)	(0.150)	(0.075)	(0.087)	(0.120)
Observations	9408	5145	4263	8010	4254	3756
Earned Degree or Certificate	0.032	0.024	0.046	0.039	-0.073	0.139
	(0.055)	(0.050)	(0.105)	(0.051)	(0.054)	(0.085)
Observations	9494	5190	4304	8073	4281	3792
Earned Degree (AA) or Certificate	0.000	0.006	-0.007	0.025	-0.047	0.093
	(0.049)	(0.039)	(0.099)	(0.045)	(0.043)	(0.079)
Observations	9494	5190	4304	8073	4281	3792
Earned Degree (BA+)	0.041	0.023	0.067	0.009	-0.049	0.046
	(0.038)	(0.050)	(0.056)	(0.030)	(0.044)	(0.041)
Observations	6579	3628	2951	5634	3019	2615

Notes: This table reports Regression Discontinuity estimates of the impact of earning a GED on the outcomes indicated in each row for members of the indicated subgroups. Quarters Enrolled is calculated for the first 16 quarters (4 years) following an individual's first GED attempt. All regressions include controls for gender, race, native language, receipt of public assistance at ABE enrollment, employment status at ABE enrollment, indicators for missing data for each of the preceding controls, and indicators for year and quarter of test. The Multi RD sample includes test completers who either passed the GED on their first attempt or failed their first attempt while passing 4 of the 5 substests or passing all 5 subtests, but failing to attain the minimum passing total score (2250). The Math RD sample includes test-completers whose first attempt math subtest score was a binding constraint determining whether they passed the GED on their first attempt. This includes test takers who pass on their first attempt as well as all individuals who completed and passed all other subtests and achieved a high enough score that earning the minimum passing score in math (410) would be sufficient to reach the minimum total passing score (2250). Standard errors are in parentheses.

* Significant at the 10 percent level.

** Significant at the 5 percent level.

*** Significant at the 1 percent level.

Table A6a: Estimated Impact of Earning a GED
on Postsecondary Enrollment, Persistence, and Degree Attainment by Race

Multi RD Sample:	White			Non-White		
	Pooled	Men	Women	Pooled	Men	Women
	(1)	(2)	(3)	(4)	(5)	(6)
Ever Enrolled in College	0.446**	0.527**	0.380	0.433	0.480	0.186
	(0.201)	(0.238)	(0.320)	(0.297)	(0.353)	(0.504)
Observations	5695	3103	2592	4093	2239	1854
Ever Enrolled (2 year)	0.477**	0.612***	0.364	0.423	0.393	0.310
	(0.198)	(0.232)	(0.318)	(0.292)	(0.341)	(0.497)
Observations	5695	3103	2592	4093	2239	1854
Ever Enrolled (4 year)	-0.058	-0.141	0.024	0.115	0.247	-0.163
	(0.087)	(0.107)	(0.138)	(0.141)	(0.174)	(0.247)
Observations	5695	3103	2592	4093	2239	1854
Quarters Enrolled	2.655**	1.877	3.647*	3.118*	2.636	2.606
	(1.172)	(1.214)	(2.067)	(1.725)	(1.857)	(3.118)
Observations	5695	3103	2592	4093	2239	1854
Enrolled 4+ Quarters	0.327**	0.191	0.447*	0.367	0.463	0.153
	(0.149)	(0.152)	(0.267)	(0.250)	(0.310)	(0.393)
Observations	5533	3009	2524	3943	2171	1772
Enrolled 6+ Quarters	0.192*	0.071	0.330*	0.316	0.175	0.392
	(0.111)	(0.111)	(0.199)	(0.201)	(0.214)	(0.352)
Observations	5514	2999	2515	3925	2161	1764
Enrolled 8+ Quarters	0.084	0.071	0.120	0.287*	0.121	0.390
	(0.088)	(0.084)	(0.162)	(0.169)	(0.179)	(0.299)
Observations	5489	2983	2506	3898	2151	1747
Earned Degree or Certificate	0.005	-0.034	0.070	0.094	0.092	0.058
	(0.061)	(0.051)	(0.121)	(0.104)	(0.106)	(0.185)
Observations	5532	3008	2524	3941	2171	1770
Earned Degree (AA) or Certificate	0.021	-0.007	0.068	-0.014	0.010	-0.088
	(0.056)	(0.043)	(0.114)	(0.089)	(0.072)	(0.174)
Observations	5532	3008	2524	3941	2171	1770
Earned Degree (BA+)	-0.016	-0.040	0.015	0.164*	0.163	0.185*
	(0.038)	(0.039)	(0.065)	(0.097)	(0.180)	(0.111)
Observations	3913	2133	1780	2652	1489	1163

Notes: This table reports Regression Discontinuity estimates of the impact of earning a GED on the outcomes indicated in each row for members of the indicated subgroups. Quarters Enrolled is calculated for the first 16 quarters (4 years) following an individual's first GED attempt. The Multi RD sample includes test completers who either passed the GED on their first attempt or failed their first attempt while passing 4 of the 5 substests or passing all 5 subtests, but failing to attain the minimum passing total score (2250). Standard errors are in parentheses.

* Significant at the 10 percent level.

** Significant at the 5 percent level.

*** Significant at the 1 percent level.

Table A6b: Estimated Impact of Earning a GED
on Postsecondary Enrollment, Persistence, and Degree Attainment by Race

Math RD Sample:	White			Non-White		
	Pooled	Men	Women	Pooled	Men	Women
	(1)	(2)	(3)	(4)	(5)	(6)
Ever Enrolled in College	0.229	0.223	0.297	0.422*	0.413	0.436
	(0.200)	(0.269)	(0.273)	(0.242)	(0.311)	(0.367)
Observations	4869	2561	2308	3422	1827	1595
Ever Enrolled (2 year)	0.282	0.338	0.312	0.394*	0.392	0.442
	(0.196)	(0.261)	(0.271)	(0.237)	(0.301)	(0.364)
Observations	4869	2561	2308	3422	1827	1595
Ever Enrolled (4 year)	-0.176**	-0.373***	-0.019	0.073	0.113	-0.003
	(0.087)	(0.126)	(0.117)	(0.116)	(0.152)	(0.175)
Observations	4869	2561	2308	3422	1827	1595
Quarters Enrolled	0.928	-1.071	2.822	2.303*	0.897	3.467
	(1.171)	(1.392)	(1.764)	(1.361)	(1.602)	(2.244)
Observations	4869	2561	2308	3422	1827	1595
Enrolled 4+ Quarters	0.191	-0.111	0.474*	0.320*	0.212	0.397
	(0.169)	(0.203)	(0.255)	(0.191)	(0.258)	(0.280)
Observations	4747	2493	2254	3312	1781	1531
Enrolled 6+ Quarters	0.119	-0.173	0.334*	0.303**	0.031	0.529**
	(0.124)	(0.146)	(0.191)	(0.149)	(0.179)	(0.248)
Observations	4731	2485	2246	3298	1775	1523
Enrolled 8+ Quarters	-0.061	-0.181	0.046	0.178	0.025	0.286
	(0.100)	(0.111)	(0.155)	(0.118)	(0.141)	(0.191)
Observations	4716	2477	2239	3277	1769	1508
Earned Degree or Certificate	-0.016	-0.162**	0.115	0.112	0.007	0.199
	(0.069)	(0.068)	(0.115)	(0.077)	(0.089)	(0.127)
Observations	4746	2492	2254	3310	1781	1529
Earned Degree (AA) or Certificate	0.007	-0.064	0.081	0.052	-0.035	0.133
	(0.064)	(0.056)	(0.109)	(0.065)	(0.065)	(0.114)
Observations	4746	2492	2254	3310	1781	1529
Earned Degree (BA+)	-0.025	-0.133***	0.035	0.057	0.027	0.072
	(0.035)	(0.049)	(0.051)	(0.052)	(0.084)	(0.067)
Observations	3384	1785	1599	2238	1229	1009

Notes: This table reports Regression Discontinuity estimates of the impact of earning a GED on the outcomes indicated in each row for members of the indicated subgroups. Quarters Enrolled is calculated for the first 16 quarters (4 years) following an individual's first GED attempt. The Math RD sample includes test-completers whose first attempt math subtest score was a binding constraint determining whether they passed the GED on their first attempt. This includes test takers who pass on their first attempt as well as all individuals who completed and passed all other subtests and achieved a high enough score that earning the minimum passing score in math (410) would be sufficient to reach the minimum total passing score (2250). Standard errors are in parentheses.

* Significant at the 10 percent level.

** Significant at the 5 percent level.

*** Significant at the 1 percent level.

Table A7a: Estimated Impact of Earning a GED
on Postsecondary Enrollment, Persistence, and Degree Attainment by Employment Status

Multi RD Sample:	Employed			Not Employed		
	Pooled	Men	Women	Pooled	Men	Women
	(1)	(2)	(3)	(4)	(5)	(6)
Ever Enrolled in College	-0.027	0.122	-0.172	0.656***	0.539***	0.757*
	(0.378)	(0.831)	(0.413)	(0.207)	(0.205)	(0.436)
Observations	2722	1278	1444	6856	3963	2893
Ever Enrolled (2 year)	0.117	0.261	0.014	0.586***	0.512***	0.622
	(0.368)	(0.812)	(0.401)	(0.202)	(0.197)	(0.427)
Observations	2722	1278	1444	6856	3963	2893
Ever Enrolled (4 year)	-0.249	-0.254	-0.317	0.132	0.101	0.181
	(0.180)	(0.403)	(0.199)	(0.091)	(0.094)	(0.190)
Observations	2722	1278	1444	6856	3963	2893
Quarters Enrolled	0.247	4.316	-2.000	4.119***	2.082**	7.378**
	(2.310)	(4.757)	(2.739)	(1.183)	(1.031)	(2.947)
Observations	2722	1278	1444	6856	3963	2893
Enrolled 4+ Quarters	0.235	0.879	0.001	0.432***	0.288**	0.623*
	(0.317)	(0.880)	(0.322)	(0.155)	(0.143)	(0.356)
Observations	2658	1254	1404	6616	3830	2786
Enrolled 6+ Quarters	-0.043	0.290	-0.153	0.383***	0.136	0.788***
	(0.260)	(0.642)	(0.272)	(0.117)	(0.100)	(0.297)
Observations	2649	1252	1397	6589	3812	2777
Enrolled 8+ Quarters	0.039	0.479	-0.144	0.216**	0.050	0.514**
	(0.209)	(0.545)	(0.227)	(0.091)	(0.078)	(0.229)
Observations	2633	1246	1387	6556	3794	2762
Earned Degree or Certificate	0.003	0.204	-0.058	0.051	0.003	0.169
	(0.139)	(0.283)	(0.161)	(0.061)	(0.050)	(0.155)
Observations	2658	1254	1404	6613	3829	2784
Earned Degree (AA) or Certificate	0.012	0.217	-0.049	0.000	-0.020	0.053
	(0.126)	(0.232)	(0.151)	(0.054)	(0.038)	(0.143)
Observations	2658	1254	1404	6613	3829	2784
Earned Degree (BA+)	-0.030	-0.039	-0.022	0.087*	0.047	0.142*
	(0.071)	(0.136)	(0.089)	(0.050)	(0.065)	(0.078)
Observations	1831	871	960	4604	2689	1915

Notes: This table reports Regression Discontinuity estimates of the impact of earning a GED on the outcomes indicated in each row for members of the indicated subgroups. Quarters Enrolled is calculated for the first 16 quarters (4 years) following an individual's first GED attempt. The Multi RD sample includes test completers who either passed the GED on their first attempt or failed their first attempt while passing 4 of the 5 substests or passing all 5 subtests, but failing to attain the minimum passing total score (2250). Standard errors are in parentheses.

* Significant at the 10 percent level.

** Significant at the 5 percent level.

*** Significant at the 1 percent level.

Table A7b: Estimated Impact of Earning a GED
on Postsecondary Enrollment, Persistence, and Degree Attainment by Employment Status

Math RD Sample:	Employed			Not Employed		
	Pooled	Men	Women	Pooled	Men	Women
	(1)	(2)	(3)	(4)	(5)	(6)
Ever Enrolled in College	0.050	1.573	-0.377	0.416**	0.190	0.684**
	(0.411)	(1.854)	(0.444)	(0.179)	(0.205)	(0.305)
Observations	2266	1017	1249	5841	3285	2556
Ever Enrolled (2 year)	0.032	0.714	-0.203	0.402**	0.279	0.557*
	(0.405)	(1.677)	(0.428)	(0.175)	(0.198)	(0.300)
Observations	2266	1017	1249	5841	3285	2556
Ever Enrolled (4 year)	-0.008	0.754	-0.203	-0.041	-0.163*	0.105
	(0.190)	(0.899)	(0.202)	(0.079)	(0.098)	(0.131)
Observations	2266	1017	1249	5841	3285	2556
Quarters Enrolled	0.131	4.151	-1.403	2.229**	-0.195	5.068***
	(2.494)	(9.437)	(2.773)	(1.010)	(1.042)	(1.922)
Observations	2266	1017	1249	5841	3285	2556
Enrolled 4+ Quarters	0.183	-1.571	0.014	0.307**	0.036	0.634**
	(0.420)	(7.677)	(0.373)	(0.140)	(0.148)	(0.261)
Observations	2222	1002	1220	5660	3191	2469
Enrolled 6+ Quarters	0.152	1.411	0.164	0.254**	-0.010	0.549***
	(0.340)	(6.266)	(0.308)	(0.104)	(0.103)	(0.203)
Observations	2214	1001	1213	5639	3178	2461
Enrolled 8+ Quarters	-0.009	-0.316	-0.068	0.066	-0.078	0.235
	(0.261)	(4.376)	(0.247)	(0.080)	(0.079)	(0.156)
Observations	2201	997	1204	5619	3170	2449
Earned Degree or Certificate	0.006	1.202	0.037	0.050	-0.067	0.205*
	(0.182)	(3.974)	(0.178)	(0.055)	(0.050)	(0.113)
Observations	2222	1002	1220	5657	3190	2467
Earned Degree (AA) or Certificate	0.009	0.245	0.025	0.033	-0.047	0.143
	(0.162)	(1.758)	(0.165)	(0.050)	(0.040)	(0.106)
Observations	2222	1002	1220	5657	3190	2467
Earned Degree (BA+)	-0.021	-0.211	0.010	0.016	-0.037	0.058
	(0.081)	(0.246)	(0.090)	(0.032)	(0.045)	(0.048)
Observations	1536	697	839	3970	2263	1707

Notes: This table reports Regression Discontinuity estimates of the impact of earning a GED on the outcomes indicated in each row for members of the indicated subgroups. Quarters Enrolled is calculated for the first 16 quarters (4 years) following an individual's first GED attempt. The Math RD sample includes test-completers whose first attempt math subtest score was a binding constraint determining whether they passed the GED on their first attempt. This includes test takers who pass on their first attempt as well as all individuals who completed and passed all other subtests and achieved a high enough score that earning the minimum passing score in math (410) would be sufficient to reach the minimum total passing score (2250). Standard errors are in parentheses.

* Significant at the 10 percent level.

** Significant at the 5 percent level.

*** Significant at the 1 percent level.