

Examining the Educational and Employment Outcomes of Reverse Credit Transfer

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What We Studied

Data from the National Student Clearinghouse shows that an estimated 36 million students in the United States previously attended a college or university but never earned a degree (Shapiro, Ryu, Huie, & Liu, 2019). Research shows that many students transfer from a community college to a university before earning an associate's degree (Hoachlander, Sikora, & Horn, 2003; McCormick & Carroll, 1997; Shapiro et al., 2013), and that many transfer students never make it across the bachelor's degree finish line (Schudde & Brown, 2019).

To address these issues, a growing number of states and institutions have implemented reverse credit transfer (RCT) policies, designed to award associate's degrees to students who transfer from 2-year to 4-year colleges after transfer. The partnership between the University of Texas – El Paso and El Paso Community College is one of first examples of RCT in the country, and the Texas Legislature passed House Bill 3025 in 2011 mandating that public colleges engage in RCT. Although preliminary research on RCT has found the receipt of an associate's degree post-transfer to be positively associated with university persistence and attainment (Taylor & Giani, 2019), the literature base on this topic is still thin, and no research to date has examined how RCT may affect students' labor market outcomes.

The purpose of this study was to address these gaps by examining how the receipt of associate's degrees after transferring to a university relates to students' university and employment outcomes in Texas. Because state data in Texas does not contain an indicator of whether an associate's degree was awarded through RCT, we estimate RCT by combining information on students' institutional enrollment, credit accumulation, and associate's degree receipt. We then examine the long-term university persistence, baccalaureate attainment, employment, and earnings of students who transferred from community colleges to universities and estimate the relationship between RCT degree receipt and these outcomes. Our methods are described further below.

In many respects, Texas has led the nation in RCT as the policy origin of RCT is often traced back to a 2006 partnership between El Paso Community College and the University of Texas at El Paso. RCT expanded significantly between 2012 and 2016 when 16 states were funded to develop and scale RCT as part of the Credit When It's Due (CWID) initiative.⁴ Texas was one of these states and the CWID effort in Texas was led by a partnership between Lone Star Community College and The University of Texas at Austin. A total of 32 Texas colleges and universities partnered as part of Texas' CWID grant under the Texas Reverse Transfer Initiative (TRTI).

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⁴ A full discussion of the results of the national research study on CWID implementation and outcomes may be found in Taylor, J. L. et al. (2017). *The Implementation and Outcomes of Credit When It's Due (CWID) in 15 States*. Seattle, WA: Community College Research Initiatives, University of Washington. This publication is available upon request.

During the past several years, there have been a number of RCT policy developments in Texas. In 2011, the Texas legislature passed HB 3025 which directed higher education institutions to begin implementing RCT policies. This policy established a common policy framework for RCT in Texas, creating a common residency requirement⁵ of 30 credits and a common eligibility requirement of 90 cumulative credits; in 2013, SB 498 lowered the cumulative credit requirement to 66 credits. Shortly thereafter, the ApplyTexas application was modified to include a consent option for transfer students so they could consent to have their university transcripts sent back to their community college for the purpose of RCT.

Although Texas' postsecondary administrative data does not contain an indicator for whether associate's degrees were awarded through RCT, research on TRTI implementation in Texas found that thousands of students who transfer from community colleges to universities without an associate's degree earn one en route to the bachelor's each year (Giani, Alexander, & Shin, 2014). Despite the widespread interest and implementation of RCT in Texas and around the country, there is surprisingly little evidence on the impact of RCT on students' education and employment outcomes. The purpose of this study is to use Texas' longitudinal data to examine how receiving an associate's degree via RCT influences students' progress toward the bachelor's degree and their employment outcomes.

How We Analyzed the Data

The following research questions are addressed in this study:

1. What is the impact of receiving the associate's degree through RCT on university persistence and baccalaureate attainment?
2. To what extent does the relationship between associate's degree receipt through RCT and university outcomes vary by students' demographic backgrounds (Pell eligibility, race/ethnicity, and age)?
3. What is the impact of receiving the associate's degree through RCT on students' labor market outcomes?
4. To what extent does the relationship between associate's degree receipt through RCT and labor market outcomes vary by students' demographic backgrounds (Pell eligibility, race/ethnicity, and age)?

Data Source

The data for this study comes from the Texas Education Research Center (TERC) at the University of Texas at Austin. TERC houses Texas' longitudinal student data system which integrates K12 data from the Texas Education Agency (TEA), postsecondary education data from the Texas Higher Education Coordinating Board (THECB), and workforce data from the Texas Workforce Commission (TWC). Each student that enrolls in an educational institution in Texas is assigned a unique identification number that is common across all three Texas data sources, allowing researchers to follow individual students from the time they enter pre-kindergarten through their postsecondary enrollment and into the workforce, provided the student remains in Texas.

The THECB data includes students' demographic characteristics, enrollment history, credits attempted, and credentials earned for all public institutions in the state. However, one limitation is that THECB did not collect data on credits earned by students until 2012. The implication of this limitation will be discussed below. Data from the TWC includes quarterly employment and earnings information collected through Texas's Unemployment Insurance (UI) collection. Because both the THECB and TWC data are specific to Texas, students who leave the state during college or for employment are not captured in state records. No data from TEA was used in this study.

Samples

The primary sample is drawn from the population of students who transferred from a public community college to a public university in Texas during the fall 2011 or spring 2012 semesters ($n = 38,036$). This is the first year after HB 3025 was passed, and research conducted through CWID and exploratory analyses of state data suggested that students who transferred during this academic year were receiving associate's degrees through RCT. From this population, we restricted the sample to students who were potentially eligible to receive an associate's degree through RCT. To be

⁵ The residency requirement is the number of credits needed at the community college to receive a degree from the college.

potentially eligible, students must have met five criteria: 1) transferred from a public community college to a public university; 2) completed the minimum number of credits prior to transfer; 3) did not earn an academic associate's degree (AA or AS) prior to transfer; 4) earned at least 60 cumulative credits (pre-transfer community college credits and post-transfer university and community college credits); and 5) did not transfer back to the community college. Although Texas state policy mandated that universities initiate RCT when eligible students reach 66 cumulative credits, because many associate's degrees only require 60 credits and some universities sent transcripts back to the community college once students reached 60 credits (Taylor et al., 2017) we used that threshold instead. Because no flag or indicator variable for RCT eligibility exists in THECB data, the following sections describe how potentially eligible students were identified.

HB 3025 (2011) specified that students who earned at least 30 SCH at a public community college prior to transferring to a public university were eligible for RCT, but research conducted through CWID uncovered that many institutions were using 15 SCH as the minimum pre-transfer credit threshold (Taylor et al., 2017). This was due to the fact that the Southern Association of Colleges and Schools (SACS), the accrediting agency with jurisdiction over public colleges in Texas, specifies that 25% of the credits required for a degree must be earned at the institution awarding the degree. Thus, students need only to have earned 15 credits at the community college to receive an associate's degree comprised of 60 credits from that institution. However, as discussed above, THECB did not collect data on credits earned prior to 2012, meaning this data was not available to estimate pre-transfer credits earned. We therefore explored defining eligibility using both 15 SCH attempted and 30 SCH attempted as the pre-transfer eligibility thresholds. As shown in our results, the findings were quite similar regardless of the threshold used, which led us to use the 15 SCH threshold in the majority of analyses as it provided a larger sample size and greater statistical power to detect significant differences.

Pre-transfer credential attainment was determined by merging all credentials awarded by community colleges between fall 2006 and the last semester before transfer (summer 2011 for fall 2011 transfers, and fall 2011 for spring 2012 transfers) and identifying students who earned an associate's degree during this timeframe. Students who earned an academic associate's degree (AA or AS) prior to transfer were excluded from the sample of potentially eligible students. However, because there is significant policy interest in strategies that encourage students to earn their associate's degree prior to transfer, we sought to compare students who received the associate's degree post-transfer to students who earned the associate's pre-transfer. We therefore used students who earned an associate's degree pre-transfer as a secondary control group, with the primary control group being students who were eligible for RCT (and thus had not earned an associate's degree pre-transfer) but did not receive the associate's degree post-transfer. Because students needed to have earned at least 60 credits in order to be eligible for an associate's degree, we combined the number of SCH students attempted at the community college prior to transfer (the same timeline as pre-transfer credential attainment) with the number of SCH earned from the university post-transfer. Because data on credits earned was available beginning in 2012, SCH earned at the university was able to be directly measured in contrast to pre-transfer SCH earned which had to be proxied with pre-transfer SCH attempted. Only students who earned at least 60 cumulative credits remained in the sample.

The final eligibility criterion was that students could not have transferred back to the community college. Although this requirement is not in state policy, because state data in Texas also omits a flag indicating whether an associate's degree was received through RCT, we sought to ensure that students in our sample did not transfer back to the community college and earn the associate's degree through traditional means rather than by transferring university credits back to the community college. However, because it is common for students to take some courses at a community college even while they are enrolled at a university (more than half of the population did so), we did not want to eliminate all students with subsequent enrollment at a community college. We hypothesized that students who earned fewer than 12 credits from a community college after university transfer were unlikely to have transferred their enrollment back to the community college and therefore only excluded students who earned more than 12 credits at the community college. Roughly three-quarters (73.1%) of the original sample of 38,036 students earned 12 or fewer credits from the community college post-transfer. With those filters applied, the sample of potentially eligible students with the 15 pre-transfer credit criterion was $n = 12,761$ students, and the sample contained $n = 10,081$ students with the 30 pre-transfer credit criterion. Descriptive characteristics of the population of transfer students, the sample of RCT eligible students,

and the sub-samples of RCT eligible students who did and did not received associate's degree through RCT are included in the Appendix.

Independent Variables

The primary independent variable of interest is whether students received an associate's degree through RCT. We consider degrees to be earned through RCT if the student was eligible for RCT as defined above, received an associate's degree, and had not transferred back to a community college and earned more than 12 credits there. In addition to this variable, the postsecondary models control for students' demographic characteristics (race/ethnicity, gender, Pell receipt, age at the time of transfer), academic characteristics (pre-transfer credits earned, pre-transfer GPA, core curriculum completion, declared major the semester of transfer), employment after university transfer, and in some models the institutions they transferred from and to. Employment after university transfer was modeled by combining all quarterly wage records between the semester the student transferred and the final semester when the student either stopped out or earned a bachelor's degree, summing the number of quarters students were employed and their total earnings during this period. Mean quarterly wage was calculated as the mean of all quarters in which the student had non-zero earnings and up through their last semester of enrollment or bachelor's degree completion. This variable was then bottom- and top-coded at the 1% (\$176.80) and 99% (\$22,558.44), respectively, to reduce the influence of outliers. The natural logarithm of the bottom- and top-coded variable was used in the analyses. Students with no quarterly wages during university enrollment were also bottom coded at the 1% to maintain their inclusion in the sample, as the natural logarithm of zero is undefined. The models control for the number of quarters employed and students' mean quarterly log-wage.

Outcome Variables

The six outcomes that are analyzed include: 1) whether a student received a bachelor's degree by spring 2016, or within five years post-transfer (1=yes, 0=no); 2) whether a student received a bachelor's degree or was still enrolled by spring 2016 (1=yes, 0=no); 3) whether a student was employed in any of the four quarters after between July, 2016 and June, 2017 ("any employment") (1=yes, 0=no); 4) whether the student was employed for all four quarters between July, 2016 and June, 2017 ("full employment") (1=yes, 0=no); 5) the student's annual earnings during the four quarters between July, 2016 and June, 2017; and 6) the student's log-earnings, calculated by taking the natural logarithm of their annual earnings, in order to limit the influence of earnings outliers and normalize the distribution of this variable. For the second outcome variable, we combined retention and attainment as both of those outcomes would still be considered a positive result in contrast to stopping out.

Statistical Methods

The study uses propensity score matching (PSM) (Austin, 2011; Glynn & Quinn, 2010; (Rosenbaum & Rubin, 1983; Tan, 2010; Xie, Brand, & Jann, 2012) to estimate the average treatment effect on the treated (ATT or ATET) of receiving an associate's degree through RCT on university and labor market outcomes. This method is part of the class of techniques that use propensity scores, or the estimated probabilities of treatment, to estimate a treatment effect. In the first step of PSM, logistic regression is used to estimate the probability of treatment controlling for pre-eligibility characteristics (demographic characteristics, pre-transfer academic characteristics, major, and institution of enrollment). We estimate the ATT, rather than the average treatment effect (ATE), because our interest is on the effect of RCT on students who were potentially eligible to receive the associate's degree. To estimate the ATT, each student in the treatment group is matched to the nearest observably equivalent student in the control group. This matching results in the treatment and control groups being statistically indistinguishable overall. Table A2 in the Appendix displays the standardized mean differences between the two groups before and after matching. According to the What Works Clearinghouse's standards for baseline equivalence, standardized mean differences less than or equal to 0.05 represents statistical equivalence, and essentially all variables in the analysis meet that standard after matching. After matching, the mean difference in the outcome for the matched groups constitutes our ATT estimate.

While many of our analyses are interested in the ATT, our fourth and final research question sought to examine whether the effect of RCT varied across subgroups. We did this in two ways. First, we fit separate PSM models to samples of particular demographic groups (by race/ethnicity, Pell eligibility, and age) to explore the extent to which the impact of RCT varied across these groups. However, while PSM is well-suited to estimate an ATE or ATT, the *teffects* procedure in Stata does not allow one to interact the treatment effect variable with other moderators. We therefore fit

fixed effect logistic regression models to our retention and attainment outcomes to explore whether demographic covariates were significant moderators of the relationship between RCT degree receipt and university outcomes, and as an additional robustness check of the findings from our PSM models. These models controlled for the community college students transferred from, the university they transferred to, and the remaining covariates included in the PSM models.

What We Discovered

Key Findings

- Post-transfer associate’s degree recipients are significantly more likely to persist and attain in universities compared to their peers who were eligible for RCT but did not receive the degree. Although this relationship may not be causal, critically we find no evidence that receiving the associate’s degree incentivizes students to stop out of university.
- In general, this relationship is stronger for historically marginalized students. The estimate was larger for Pell recipients compared to non-recipients (10.6% vs. 3.8%), older students compared to younger students (11.2% vs. 8.9%), and Latinx students compared to white students (10.6% vs. 4.7%).
- However, we find limited evidence that the post-transfer associate’s degree improves students labor outcomes, even for university stopouts. We hypothesize this is due to the major of associate’s degrees awarded through RCT being transfer-oriented degrees.

Table 1 contains the estimates of the average treatment effects on the treated (ATT) of receiving an associate’s degree through reverse credit transfer on university outcomes for all eligible students. These estimates were generated using the PSM method. The results show that receiving an associate’s degree through reverse credit transfer is associated with roughly a 7-8% percentage point increase in the likelihood of baccalaureate attainment and persistence. The estimates are remarkably consistent across both outcomes (bachelor’s attainment and attainment or persistence) as well as for the two eligibility groups, ranging from a low of 7.2% percentage points to a high of 7.7%. All of these estimates are significant at the $p < .001$ level. Because of the consistency of estimates between the 15 SCH and 30 SCH subgroups, we use the latter for the following analyses as it provides a larger sample size.

Table 1

Average Treatment Effects on the Treated of RCT Associate’s Receipt on University Outcomes, All RCT Eligible Students

	Bachelor's	Bachelor's or Persisted
RCT Assoc - 15 SCH Elig ($n = 13,962$)	0.0724*** (0.0146)	0.0733*** (0.0133)
RCT Assoc - 30 SCH Elig ($n = 11,164$)	0.0765*** (0.0157)	0.0744*** (0.0149)

Notes: * $p < .05$, ** $p < .01$, *** $p < .001$. ATT estimates were generated using propensity score matching. The treatment models control for student demographic characteristics, pre-transfer SCH attempted, pre-transfer GPA, pre-transfer completion of the core curriculum, pre-transfer certificate completion, the number of developmental education SCH attempted in math, reading, and writing prior to transfer, and declared major.

Because many states and postsecondary institutions recommend that students complete their associate’s degree prior to transfer, we next investigated the relative university persistence and bachelor’s completion rates for students who earned their associate’s degree prior to transfer compared to students who received an associate’s through reverse credit transfer. The results of the PSM models are found in Table 2. In all models, reverse credit transfer degree recipients were significantly more likely to persist and complete their bachelor’s degree compared to students who earned their associate’s degree prior to transfer. For the 15 SCH and 30 SCH groups, the estimated differences in baccalaureate attainment were 5.3% and 4.7%, and the estimated differences in persistence or attainment were 7.1% and 6.7%, respectively. Because our outcomes were measured in a fixed amount of time post-transfer and are also a

measure of time-to-degree or timely degree completion, these results suggest that on average, receiving an associate’s degree after transfer via RCT is a faster route to bachelor’s degree completion than completing an associate’s degree prior to transfer.

Table 2

Average Treatment Effects on the Treated of RCT Associate’s Receipt on University Outcomes, RCT Degree Recipients vs. Pre-Transfer Associate’s Degree Recipients

	Bachelor's	Bachelor's or Persisted
RCT Assoc (15 SCH Elig)	0.0532*** (0.0148)	0.0713*** (0.0142)
<i>n</i>	9,124	

Notes: * $p < .05$, ** $p < .01$, *** $p < .001$. ATT estimates were generated using propensity score matching. The treatment models control for student demographic characteristics, pre-transfer SCH attempted, pre-transfer GPA, pre-transfer completion of the core curriculum, pre-transfer certificate completion, the number of developmental education SCH attempted in math, reading, and writing prior to transfer, and declared major.

How Students’ Demographic Backgrounds Moderate the Impact of RCT on University Outcomes

We next assessed whether the relationship between receiving an associate’s degree through RCT and university outcomes was moderated by students’ demographic backgrounds. We once again used AIPW models to estimate these relationships, in this instance fitting separate models to each demographic group. The results of these models are found in Table 3. In all instances but one, the estimated relationship between receiving the associate’s degree through reverse credit transfer and university outcomes was larger for groups historically underrepresented in higher education. The estimates for Pell recipients were 2.9% to 3.7% larger than for non-Pell recipients, the estimates for older students were 2.7% to 3.9% larger than for younger students, and the estimates for Latinx students were 3.8% 5.1% larger than for White students. The one exception to this trend was Black students, among whom associate’s degree recipients were no more or no less likely to persist or complete their bachelor’s degree compared to non-recipients.

Table 3

Average Treatment Effects on the Treated of RCT Associate’s Receipt on University Outcomes, by Demographic Background

	Pell	Non-Pell	Black	Latinx	White	25 or Under	Over 25
Bachelor’s	0.0978*** (0.0158)	0.0609** (0.0162)	-0.0232 (0.0415)	0.1060*** (0.0175)	0.0678*** (0.0159)	0.0680*** (0.0134)	0.0951** (0.0214)
Bachelor’s or Persisted	0.106*** (0.0189)	0.0378* (0.0176)	0.0618 (0.0507)	0.1060*** (0.0207)	0.0473** (0.0182)	0.0888*** (0.0157)	0.112*** (0.0253)
<i>n</i>	6,873	7,089	1,040	5,042	6,942	10,757	3,190

Notes: * $p < .05$, ** $p < .01$, *** $p < .001$. ATT estimates were generated using propensity score matching. The treatment models control for student demographic characteristics, pre-transfer SCH attempted, pre-transfer GPA, pre-transfer completion of the core curriculum, pre-transfer certificate completion, the number of developmental education SCH attempted in math, reading, and writing prior to transfer, and declared major.

Reverse Credit Transfer and Short-Term Labor Outcomes

Given what is known about the relationship between educational attainment and labor short-term market outcomes, the findings above suggest that reverse credit transfer will improve students’ short-term labor outcomes vis-à-vis bachelor’s degree receipt. However, it is unknown whether the associate’s degree provides short-term labor market benefits to baccalaureate recipients above and beyond the bachelor’s degree or to students who stop-out before earning a bachelor’s. The latter group is particularly critical to investigate, given that a primary motive of RCT is to ensure that stop-outs are provided with some postsecondary credential to ensure they are recognized in the labor market for the progress they have made in higher education.

The ATT estimates of these models are found in Table 4. Using this method, we found mixed evidence of positive relationships between associate’s receipt and short-term labor outcomes for the full sample once we controlled for baccalaureate attainment. Receiving the associate’s degree via RCT had no additional benefit on whether students would be employed. However, the log-earnings model found that associate’s degree recipients had 4.6% greater earnings than non-recipients. This difference was significant at the $p < 0.10$ level but not the $p < 0.05$ level.

Table 4

Average Treatment Effects on the Treated of RCT Associate’s Receipt on Short-Term Labor Outcomes, All RCT Eligible Students

	Annual Earnings	Log Earnings	Any Employment	Full Employment
RCT Assoc (15 SCH Elig)	-157.0 (828.7)	0.0191 (0.0277)	0.0060 (0.0089)	0.0129 (0.0107)
<i>n</i>	11356	11356	13962	13962

Notes: * $p < .05$, ** $p < .01$, *** $p < .001$. ATT estimates were generated using propensity score matching. The treatment models control for student demographic characteristics, pre-transfer SCH attempted, pre-transfer GPA, pre-transfer completion of the core curriculum, pre-transfer certificate completion, the number of developmental education SCH attempted in math, reading, and writing prior to transfer, and declared major.

While the previous models included all eligible students as the sample, the relationship between receiving an associate’s degree through RCT and students’ short-term labor market outcomes may vary based on whether the student subsequently received the bachelor’s degree. The next models examine the impact of the RCT degree separately for university stop-outs and baccalaureate recipients. The results of these models are found in Table 5. Unexpectedly, receiving the associate’s degree was estimated to provide much greater benefit for students who earned a bachelor’s degree compared to students who stopped-out. The estimates for all of the short-term labor market outcomes were close to zero and non-significant for stop-outs, while receiving the associate’s degree was associated with a 5.0% increase in log-earnings for bachelor’s recipients ($p < .10$). The relationship was positive but non-significant for the remaining outcomes among bachelor’s recipients.

Table 5

Average Treatment Effects of RCT Associate’s Receipt on Labor Outcomes, by Bachelor’s Degree Receipt

	Annual Earnings	Log Earnings	Any Employment	Full Employment
Stopouts	558.1 (1176.6)	0.0373 (0.0670)	-0.0407* (0.0245)	-0.0422 (0.0296)
Bachelor’s Recipients	-665.8 (965.8)	0.0147 (0.0422)	-0.0034 (0.0136)	0.0136 (0.0165)
<i>n (Stopouts)</i>	3,033	3,033	4,002	4,002
<i>n (Bachelor’s Recipients)</i>	8,255	8,255	9,844	9,844

Notes: * $p < .05$, ** $p < .01$, *** $p < .001$. ATT estimates were generated using propensity score matching. The treatment models control for student demographic characteristics, pre-transfer SCH attempted, pre-transfer GPA, pre-transfer completion of the core curriculum, pre-transfer certificate completion, the number of developmental education SCH attempted in math, reading, and writing prior to transfer, and declared major.

The final analyses investigate the extent to which the relationship between receiving the associate’s degree via RCT and short-term labor outcomes varies by students’ demographic backgrounds for stopouts, the results of which are found in Table 6. The results show that receiving the associate’s degree has minimal relationship with students’ short-term labor outcomes among students who did not earn a bachelor’s degree, apart from a few instances. The only significant difference for log-earnings was for White students, who were estimated to earn significantly less if they received an associate’s degree through RCT.

Table 6

Average Treatment Effects on the Treated of RCT Associate’s Receipt on Short-Term Labor Outcomes of Stop-outs, by Demographic Background

	Pell	Non-Pell	Black	Latinx	White	25 or Under	Over 25
Any Employment	-0.0098 (0.0356)	-0.0072 (0.0374)	-0.0492 (0.0389)	0.0086 (0.0387)	-0.0086 (0.0392)	-0.0466 (0.0323)	-0.0046 (0.0423)
Log-Earnings	-0.0337 (0.0951)	-0.0877 (0.0857)	-0.2860 (0.1810)	-0.0597 (0.1260)	-0.0264 (0.0800)	-0.0275 (0.114)	-0.0792 (0.129)
<i>n</i> (Employment)	2,236	1,717	332	1,556	1,654	2,839	1,076
<i>n</i> (Earnings)	1,692	1,306	269	1,201	1,235	2,176	791

Notes: * $p < .05$, ** $p < .01$, *** $p < .001$. ATT estimates were generated using propensity score matching. The treatment models control for student demographic characteristics, pre-transfer SCH attempted, pre-transfer GPA, pre-transfer completion of the core curriculum, pre-transfer certificate completion, the number of developmental education SCH attempted in math, reading, and writing prior to transfer, and declared major.

Policy Recommendations

Texas, like many states across the country, has a significant number of citizens who fall in the category of “some college, no degree.” According to the 2016 American Community Survey, there were 1,004,377 Texans with 1 or more years of college, but no degree. RCT policies are designed to ensure that increasing numbers of students, particularly students who transfer from community colleges to universities but do not complete a bachelor’s degree, receive recognition for the credits they’ve earned in the form of a postsecondary credential. RCT is therefore one strategy for helping THECB meet its goal of having 60% of 25-34 year olds hold a postsecondary credential by 2030.

The results from this study suggest that RCT may be a viable strategy for increasing associate’s degree attainment and bachelor’s degree attainment, and the state should continue to promote and advance RCT policies. Because we found that completing an associate’s degree via RCT increases bachelor’s degree completion, policymakers and institutional leaders should communicate the benefit of RCT on bachelor’s degree completion to students and families. The finding that completing an associate’s degree post-transfer via RCT has a greater impact on bachelor’s degree completion than pre-transfer has implications for transfer and transfer pathways reform. It suggests that community college and university partnerships should identify the optimal points of transfer and associate’s degree completion within a transfer pathways framework. Although community colleges might be concerned about early transfer and decreased associate’s degree completion if they promote RCT policies, the results from this study suggest that RCT policies may provide more benefit than harm because they increase associate’s degree attainment and more timely bachelor’s degree attainment than completing an associate’s degree pre-transfer. Given that students decide to transfer at different points in time and for different reasons, policies should be created that are flexible to meet students’ needs and circumstances.

Finally, the results generally found no additional impact of the associate’s degree via RCT on short-term labor market outcomes. On the one hand, this is positive because the purpose of RCT is not to encourage students to stop-out and seek employment with their new credential. Our results suggest that doing so does not provide an economic advantage in the short term, and policymakers should communicate this to students. On the other hand, this is negative because research show that associate’s degree holders have higher labor market outcomes compared to those with some college, no degree (Grubb, 1993, 1997; Scheld, 2019). Some transfer students may complete the associate’s degree via RCT and have to stop-out for reasons beyond their control, but our results suggest they’ll have no labor market advantage in the short-term. However, longer-term data on lifetime labor market outcomes suggest that associate’s degree completers will have better labor market outcomes compared to the some college, no degree population, so it might just take more time for these outcomes to be realized. Again, the results suggest that policymakers and leaders should be aware of these short-term and longer-term labor market effects and adjust their communication with students and families.

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Appendix

Table A1: Descriptive Characteristics of Samples

Variable	All Transfers					RCT Eligible 15		RCT Eligible 15, No Degree		RCT Eligible 15, Degree	
	N	Mean	SD	Min	Max	N	Mean	N	Mean	N	Mean
Race Asian	38036	0.043	0.202	0	1	12761	0.039	10030	0.042	2731	0.028
Race Black	38036	0.096	0.295	0	1	12761	0.077	10030	0.080	2731	0.065
Race Latinx	38036	0.361	0.48	0	1	12761	0.354	10030	0.323	2731	0.469
Race International	38036	0.022	0.147	0	1	12761	0.005	10030	0.005	2731	0.004
Race Native American	38036	0.005	0.069	0	1	12761	0.004	10030	0.004	2731	0.004
Race Native Haw/Pac Island	38036	0.003	0.056	0	1	12761	0.003	10030	0.003	2731	0.004
Race Unknown/Other	38036	0.013	0.145	0	1	12761	0.02	10030	0.020	2731	0.021
Race White	38036	0.457	0.498	0	1	12761	0.505	10030	0.530	2731	0.413
Any Pell	38036	0.462	0.499	0	1	12761	0.488	10030	0.469	2731	0.559
Pell Dollars (in 1000s)	38036	1.658	2.124	0	5.55	12761	1.899	10030	1.867	2731	2.018
Female	38036	0.572	0.495	0	1	12761	0.541	10030	0.524	2731	0.602
Age	38036	24.733	7.345	14	70	12761	23.326	10030	23.009	2731	24.488
Pre-Transfer Credits	38036	35.665	25.498	0	159	12761	46.619	10030	44.96	2731	52.708
Dev Ed Math Taken	38036	0.155	0.362	0	1	12761	0.19	10030	0.169	2731	0.267
Dev Ed Read Taken	38036	0.056	0.229	0	1	12761	0.064	10030	0.051	2731	0.115
Dev Ed Write Taken	38036	0.042	0.201	0	1	12761	0.048	10030	0.041	2731	0.072
Math Dev Ed SCH	38036	0.808	2.289	0	30	12761	0.971	10030	0.865	2731	1.358
Read Dev Ed SCH	38036	0.220	1.016	0	20	12761	0.252	10030	0.201	2731	0.438
Write Dev Ed SCH	38036	0.166	0.892	0	21	12761	0.182	10030	0.160	2731	0.265
Pre Transfer GPA	32177	2.907	0.679	0	4	12761	2.910	10030	2.895	2731	2.961
Pre Transfer AA max	38036	0.128	0.334	0	1	12761	0	10030	0	2731	0
Pre Transfer AS max	38036	0.053	0.225	0	1	12761	0	10030	0	2731	0
Pre Transfer AAS max	38036	0.046	0.209	0	1	12761	0	10030	0	2731	0
Pre Transfer AAT max	38036	0.015	0.122	0	1	12761	0	10030	0	2731	0
RCT Eligible 15	38036	0.335	0.472	0	1	12761	1	10030	1	2731	1
RCT Eligible 30	38036	0.265	0.441	0	1	12761	0.79	10030	0.762	2731	0.896

Univ SCH Attempt	37954	66.788	35.453	1	245	12760	79.769	10029	81.236	2731	74.381
Univ SCH Earned	38036	62.713	35.542	0	241	12761	75.754	10030	76.925	2731	71.453
Univ GPA	37954	2.489	0.994	0	4	12760	2.611	10029	2.58	2731	2.723
RCT Assoc 15	38036	0.072	0.258	0	1	12761	0.214	10030	0	2731	1
RCT Assoc 30	38036	0.064	0.245	0	1	12761	0.192	10030	0	2731	0.896
Post Transfer AA	38036	0.113	0.317	0	1	12761	0.152	10030	0	2731	0.71
Post Transfer AS	38036	0.042	0.2	0	1	12761	0.048	10030	0	2731	0.226
Post Transfer AAS	38036	0.018	0.131	0	1	12761	0.006	10030	0	2731	0.029
Post Transfer AAT	38036	0.012	0.11	0	1	12761	0.015	10030	0	2731	0.07
Post Transfer Acad Assoc	38036	0.129	0.335	0	1	12761	0.158	10030	0	2731	0.736
Post Transfer App Assoc	38036	0.054	0.225	0	1	12761	0.063	10030	0	2731	0.295
Post Transfer Assoc	38036	0.175	0.38	0	1	12761	0.214	10030	0	2731	1
Post Transfer CC Enroll	38036	0.548	0.498	0	1	12761	0.474	10030	0.418	2731	0.679
Bach Or Enroll	38036	0.626	0.484	0	1	12761	0.747	10030	0.737	2731	0.787
Bachelors Max	38036	0.587	0.492	0	1	12761	0.707	10030	0.696	2731	0.747
Grad Degree Max	38036	0.029	0.168	0	1	12761	0.03	10030	0.028	2731	0.037
Any Employment	38036	0.779	0.415	0	1	12761	0.808	10030	80.6%	2731	81.2%
Full Employment	38036	0.646	0.478	0	1	12761	0.676	10030	67.0%	2731	69.6%
Annual Wages2016_17	29639	39214.58	28124.74	0.01	813416.4	10306	38347.37	8088	38319.42	2218	38449.31
Annual Wages2016_17_Top	29639	38870.13	25840.44	0.01	133045.4	10306	38056.29	8088	38115.5	2218	37840.37

Table A2:
Standardized Mean Differences of Treatment and Control Groups Before and After
Propensity Score Matching

	Std. Differences	
	Raw	Matched
<i>Race/Ethnicity (White)</i>		
Asian	-0.07	0.01
Black	-0.07	0.00
Hispanic	0.28	0.00
Nat Amer	0.01	0.02
Nat Haw/Pac Isl	0.02	0.01
International	-0.03	0.05
Unknown	-0.01	0.01
<i>Female (Male)</i>	0.11	-0.03
<i>Age Category (18-21)</i>		
<18	-0.22	0.04
22-25	-0.01	-0.04
26-30	0.11	0.00
31-35	0.06	-0.01
36-40	0.07	0.00
41-50	0.06	-0.03
50+	-0.03	-0.02
Pell Dollars (in 1000s)	0.06	0.00
Pre-Transfer GPA	0.08	-0.01
Pre-Transfer Credits	0.38	-0.02
Pre-Transfer Core Curriculum	0.31	0.04
Pre-Transfer Certification	-0.09	-0.02
Math Dev Ed SCH	0.16	0.01
Read Dev Ed SCH	0.18	-0.01
Writing Dev Ed SCH	0.09	-0.06