NBER WORKING PAPER SERIES

A PROMISE WORTH KEEPING?
IMPACTS OF FREE COMMUNITY COLLEGE ON DEGREES AND EARNINGS

Paige Schoonover
Jonathon Attridge
Celeste K. Carruthers
Jilleah G. Welch

Working Paper 35226
http://www.nber.org/papers/w35226

NATIONAL BUREAU OF ECONOMIC RESEARCH
1050 Massachusetts Avenue
Cambridge, MA 02138
May 2026

This combines two papers that previously circulated as "A Promise Worth Keeping? Impacts of Tennessee Promise" (Schoonover, 2025) and "Free community college and college completion: Evidence from Tennessee" (Attridge, Carruthers & Welch, 2025). We thank many people for valuable comments and feedback as this project evolved, including Cameron Conrad, Bruno Ferman, Amanda Klafehn, Brian Cadena, Terra McKinnish, Tania Barham, Richard Mansfield, Oded Gurantz, Canyon Bosler, and seminar and conference participants at the Association for Education Finance and Policy, University of Pittsburgh, Carnegie Mellon University, Virginia Tech, University of Florida, University of Wisconsin Institute for Research on Poverty, Cornell University, University of Colorado Boulder, Triangle Economics of Education Workshop, Southern Economic Association, Upjohn Institute, and University of Nebraska. An early phase of this project was supported by funding from the Gates Foundation and Tennessee Higher Education Commission. Attridge is currently employed by the State of Tennessee and has collaborated with the Tennessee Higher Education Commission to support the use of data related to the Tennessee Promise program. All opinions and errors are our own. The views expressed herein are those of the authors and do not necessarily reflect the views of the National Bureau of Economic Research.

A Promise Worth Keeping? Impacts of Free Community College on Degrees and Earnings
Paige Schoonover, Jonathon Attridge, Celeste K. Carruthers, and Jilleah G. Welch
NBER Working Paper No. 35226
May 2026
JEL No. D04, I22, I23

ABSTRACT

We study Tennessee Promise, Tennessee's tuition-free community college program, which preceded similar programs in over twenty states and multiple federal proposals. We examine how Promise affected college enrollment and early adult outcomes as the program expanded from a single-county pilot to statewide eligibility. Promise increased college enrollment by 5.4 percentage points among 19-year-olds, increased transfers from two-year to four-year schools, increased associate's degree attainment by 2.9 percentage points among 21-year-olds, imprecisely increased bachelor's degree attainment by age 24, and weakly increased income from age 21. We estimate that the program pays for itself under reasonable assumptions about returns to college.

Paige Schoonover
Saint Mary's College of California
pes10@stmarys-ca.edu

Jonathon Attridge
Tennessee Office of Evidence and Impact
jonathon.m.attridge@tn.gov

Celeste K. Carruthers
University of Tennessee, Knoxville (UT)
Department of Economics
and NBER
carruthers@utk.edu

Jilleah G. Welch
University of Tennessee, Knoxville (UT)
jgwelch@utk.edu

1 Introduction

"Free college" is a compelling message and commitment that national, state, and local governments, as well as colleges themselves, routinely use to maintain access to an affordable higher education, attract students to particular schools, programs, or occupations, retain students in-state, or simplify the outcome of a complex and uncertain patchwork of scholarships, grants, and tuition discounts. Although the ethos of free education has a long history, free college in the United States has generally come with eligibility criteria that limit expenditures or reflect funder preferences. A leading example is the U.S. GI Bill, which conditions generous postsecondary benefits on a period of military enlistment. Publicly funded merit-based scholarships such as the Georgia and Tennessee HOPE scholarships were initially set to cover their respective flagship university's tuition, and are available to high-achieving students who enroll in-state. Some states offer early-commitment scholarships to middle or high school students who pledge to adhere to academic and behavioral standards before enrolling in college. Other conditional tuition-free opportunities include grants covering the tuition cost of specific programs, or loan forgiveness following a period of employment in specific fields. Most recently, local and state "Promise" programs have grown in number and scope throughout the United States, offering the latest iteration of free college to perhaps the largest class of eligible students (Miller-Adams and Iriti, 2022).

We study the introduction and expansion of one such program, Tennessee Promise, the first statewide tuition-free community college program in the United States. Beginning with the high school graduating class of 2015, Tennessee Promise guaranteed recent high school graduates free tuition and mandatory fees at the state's public community colleges and colleges of applied technology. The program received considerable state and national attention, including a visit from President Obama in 2015, who announced the first national proposal for free community college from Pellissippi State Community College in

Knoxville (Tennessee Board of Regents, 2015). "America's College Promise" was not implemented during the Obama administration, and later iterations in the Biden administration were also unsuccessful (Startz, 2021; Meyer et al., 2024). Nonetheless, tuition-free college has expanded since 2015 as other states implemented or broadened their own Promise programs, many sharing Tennessee's focus on community colleges and last-dollar funding (Campaign for Free College Tuition, 2022).

The state's "Promise" is to cover any gap between full-time tuition and fees and a student's other sources of grant aid. Since most students are eligible for need-based Pell grants and/or state merit aid, the cost per participating student is very low: under $1,000 per year.[1] The program was notable not only for its scale, but also for its simplicity. Eligibility was not conditioned on income, academic performance, or field of study, but instead on timely application, completion of mentoring and community service requirements, and continuous enrollment immediately after high school.

Tennessee Promise expanded from a single-county pilot program in 2009 to a statewide policy by 2015, with little change in eligibility criteria or benefits. This provides a rare opportunity to study how a Promise model performs as it scales. The single-county phase of Promise increased eligible students' college enrollment by 2-3 percentage points, or up to 7% of the mean (Carruthers and Fox, 2016), and increased associate's degree attainment by 1 percentage point (24%) (Carruthers et al., 2025). Initial research indicated that the statewide phase of Promise increased eligible students' college enrollment by at least 40% (Nguyen, 2020). However, enrollment responses alone do not reveal whether tuition-free college leads to lasting improvements in educational attainment, labor market outcomes, or broader life cycle decisions. Here, we use a combination of institution-level data from the Integrated Postsecondary Education Data System (IPEDS) and individual-level data

[1] Students can maintain Promise eligibility with 2 terms of full-time enrollment per year. Scholarship expenses average $1,800 per student across up to 5 semesters (Tennessee Higher Education Commission, 2024b).

from the American Community Survey (ACS) to estimate effects of all Tennessee Promise phases, including the first-in-the-nation statewide implementation in 2015. We estimate the effect of Promise on the likelihood that an eligible high school graduate enrolls in college, the likelihood that they attain an associate's or bachelor's degree, as well as labor market and household outcomes over ages 18-24.

Figure 1 previews our results for college enrollment. We find that the statewide expansion of Promise in Tennessee (panel A) corresponded with a sharp increase in first-time freshmen enrollment in the state's community colleges and technical colleges, where aid could be used, alongside a small decline in four-year college and university enrollment (panel B).

In the ACS, age 18-19 high school graduates were much more likely to report that they were attending school after 2015 (panel C).[2] Looking within the state, we see that in counties with privately funded free community college programs prior to Tennessee Promise, college enrollment rates started to rise in 2013, one year after the largest of those programs (and precursor to Tennessee Promise) began to expand across the state (panel D). Enrollment leaped in the remaining counties once the statewide Promise took over in 2015. Trends for degree attainment in Figure 2 point to a rising rate of associate's degree attainment for Tennessee 20-22-year-olds that accelerated after 2016, with the first cohorts who would have been eligible for statewide Tennessee Promise.

Regression results agree with these descriptive patterns. Access to Promise raised the likelihood of postsecondary attendance among 18-19-year-olds by 5.4 percentage points (8.9% of the counterfactual mean), with somewhat larger estimated effects for Nonwhite

[2]Figure 1 panel C trends for postsecondary enrollment exclude 2020. Enrollment rates for this population were higher than in adjacent ACS years, which is inconsistent with evidence that college enrollment declined in 2020 (National Student Clearinghouse, 2022; Tennessee Higher Education Commission, 2024a). This may be due to experimental weights used to adjust for ACS collection problems and data quality challenges during the pandemic (IPUMS, 2024). Our main regression results include 2020 ACS samples, although results are robust to their exclusion (Figure A5).

students and students outside of metro areas. Shifting ahead to ages 20-23, we can attribute a 1.3-3.1 percentage-point higher likelihood of associate's degree attainment to Promise, or up to 37% of the counterfactual by age 22.

Diversion is a prominent concern with financial aid that is limited to two-year institutions, namely the possibility that programs like Promise reroute students away from four-year colleges that tend to have more resources and higher graduation rates. Consistent with initial diversion, we find that increased Promise exposure is associated with an 8-9 percent increase in transfer-in students at four-year institutions, indicating that more students reached the four-year sector through the transfer pathway rather than through direct entry. Despite these changes in enrollment pathways, our results suggest that diversion did not translate into lower bachelor's degree attainment. Descriptive patterns for bachelor's degree attainment in Figure 2, panel B, together with our regression results, show no decline in bachelor's degree completion 5 to 6 years after high school. Instead, we estimate small and imprecisely positive effects on bachelor's degree conferral at four-year institutions and on individual bachelor's degree attainment.

Education is not the only margin for which Promise may matter, particularly when it changes the timing of schooling. Beyond education, we find evidence that Promise meaningfully alters the early adult transition period. ACS data give us the opportunity to explore effects of Promise on labor market outcomes, bearing in mind that it is difficult to forecast earnings trajectories from the immediate post-schooling years (Minaya and Scott-Clayton, 2018). We estimate that Promise has no impact on labor force participation or occupation score, although wage and salary income rises by 6-8% for ages 21-24. Finally, Promise delays marriage and childbearing in early adulthood. A Promise-eligible individual was 27% less likely to be married prior to age 21, and 17% less likely to have one or more children in the household by age 22.

We factor projected returns to additional degrees into a welfare evaluation of Promise,

following the marginal value of public funds (MVPF) framework (Hendren and Sprung-Keyser, 2020). The MVPF is the ratio of individual benefits to public spending, both net of changes in tax revenues. Our estimated gains in tax revenues from higher lifetime earnings would cover public expenditures on tuition discounts and subsidies for greater enrollment and persistence, leading to an infinite MVPF. This aligns with what Hendren and Sprung-Keyser (2020) report as typical for college programs targeting young adults.

One insight that these findings add to the financial aid literature, and in particular, research on other "free college" Promise programs, is evidence that a local program can effectively scale with statewide implementation. In the short term, eligibility for the statewide phase of Promise raised degree attainment by at least as much as eligibility for the single-county phase. Second, our attainment findings indicate that a free community college program can raise two-year college completion without penalizing the likelihood of four-year college completion. Within 6 years of high school, Promise-eligible students were not significantly more or less likely to have attained a bachelor's degree. This echoes work by Carruthers et al. (2025), who find no significant effects of the single-county phase on bachelor's degree receipt. In a review of 43 financial aid studies, Nguyen et al. (2019) show that each $1,000 in additional grant aid can raise degree completion by 1.8-2.2 percentage points. With expenses of less than $1,000 per Promise student per academic year, Promise meets or exceeds this range over the 4-6 years following high school.

2 Background and Related Research

In Tennessee, privately funded free college programs date back to 1999, when the Ayers Foundation began serving residents of two rural counties in the southwestern part of the state, combining need-based college scholarships with advising and requiring students to remain drug-free and have no criminal record. The state's now-dominant Promise model

was initiated in Knox County with the 12th grade class of 2009 and served that county alone for three years. Beginning with the class of 2012, Knox Achieves became tnAchieves and expanded to include 27 counties before statewide implementation as Tennessee Promise in 2015. The statewide phase of Tennessee Promise was part of a "Drive to 55" campaign, which set the goal of increasing the percentage of Tennesseans with a postsecondary degree or certificate to 55% by 2025. Figure 1 panel A plots the expansion in terms of 12th grade cohort eligibility.

The structure of Knox Achieves, tnAchieves, and Tennessee Promise were very similar, and we refer to them jointly as Promise or the Promise model. All three programs provided mentoring and last-dollar tuition grants to students making a seamless transition from high school to college, required periodic community service, and required that students file for federal financial aid. Specifically, students are eligible for Promise if they are Tennessee residents, submit a short program application in the fall of their last year of high school, submit a Free Application for Federal Student Aid (FAFSA), complete mentoring and community service requirements, enroll in an eligible institution the fall term after graduating, and maintain a 2.0 GPA while enrolled. Eligible institutions include any of the state's community colleges or colleges of applied technology. Program costs and scholarship spending also changed very little from one phase to the next. The average Tennessee Promise award amount in 2015-16 was $500-600 per semester, rising to $900-1,000 per semester when $0 awards are excluded (Tennessee Higher Education Commission, 2024b). Key programmatic differences between the three Promise iterations are that (1) Knox Achieves and tnAchieves were privately funded, whereas Tennessee Promise scholarships are paid out of endowed lottery reserves, (2) Tennessee Promise is available to private and home-schooled high school graduates,[3] whereas the earlier programs were limited to public high school

[3]Students who drop out of high school are also eligible if they earn a GED or HiSET prior to their 19th birthday.

students, and (3) Tennessee Promise grants can be used at four-year schools with associate programs.[4]

The breadth of access to Tennessee Promise and place-based aid programs more generally is what sets them apart from other financial aid vehicles that also tout "free college." Many Promise scholarships do not have income, achievement, service, program, or post-schooling work criteria. Access to financial aid or lower tuition tends to help more students go to college (Deming and Dynarski, 2010), more so if aid eligibility is simple and certain (Page and Scott-Clayton, 2016; Burland et al., 2023). This may be why free-college programs that hinge on student take-up in middle grades and performance benchmarks throughout high school have had limited or even negative effects on college outcomes (Harris et al., 2023; Goldhaber et al., 2020; Harris and Mills, 2025). Merit-based aid, which by design targets higher achieving high school students who are already likely to go on to college, as well as need-based aid for lower-income students, have likewise had varying effects on college enrollment across different contexts (Cornwell et al., 2006; Bruce and Carruthers, 2014; Fitzpatrick and Jones, 2016; Denning et al., 2019; Eng and Matsudaira, 2021; Heller et al., 2025). By contrast, broad-based Promise programs that award tuition grants regardless of family background or prior performance are more consistently linked to higher rates of college enrollment for traditional-aged students (Carruthers and Fox, 2016; Bartik, 2014; Bifulco et al., 2019; Page et al., 2019; House and Dell, 2020; Bartik et al., 2021; Bell, 2021b; Carruthers et al., 2025) and, less consistently, college completion (Monaghan, 2025).

Today's Promise programs differ in two major respects. Which colleges they cover is the first. Many are narrowly designed around one specific college and its surrounding community. Single-school Promise programs have increased enrollment, transfer, and degree

[4]In participating four-year schools, Tennessee Promise grant amounts are capped at average in-state community college tuition and fees.

attainment in some settings (Bell, 2021a; Bell and Gandara, 2021; Gandara and Li, 2020; Hyder, 2024), but not universally (Monaghan and Hawke, 2024), and not to the extent that researchers can detect community-wide changes in attainment for eligible cohorts (Ruiz et al., 2020). Others, like the El Dorado Promise and Kalamazoo Promise, support students from a specific community who attend many different colleges and universities. Generally, multi-institution Promise programs have been found to positively impact enrollment, persistence, and attainment (Andrews et al., 2010; Bartik et al., 2021; Bifulco et al., 2019; Carruthers and Fox, 2016; Daugherty and Gonzalez, 2016; Page et al., 2019; Swanson and Ritter, 2020).

Statewide Promise programs are broad both in terms of eligibility and the set of institutions where aid can be used. Tennessee Promise is a leading example of this model and has been the focus of most research on statewide Promise-style financial aid. Early on, annual reports from the Tennessee Higher Education Commission documented unprecedented gains in college going for the class of 2015 and later (Tennessee Higher Education Commission, 2024b), similar to what we show in Figure 1. Subsequent research showed that enrollment gains were concentrated in eligible institutions (Bell, 2021b) and well exceeded trends in other states (House and Dell, 2020; Nguyen, 2020). Other findings include higher tuition at Promise-eligible institutions (Bell, 2021b), lower borrowing among eligible students (Odle et al., 2021), lower rates of enlistment into the military (Brown et al., 2025), and the emergence of supplementary programs that assist students with advising, networking, and non-tuition costs of attending college (Dickason et al., 2023; Carruthers and Pratt, 2024). After Tennessee Promise's introduction in 2015, over 20 other states quickly followed with their own variations on tuition-free college. Gurantz (2020) found that the Oregon Promise increased enrollment in the state's two-year schools, but largely due to students substituting away from four-year schools. Hodara and Childress (2021) find suggestive evidence that marginal eligibility for Oregon Promise increased college

persistence and degree completion, although results were imprecise due to small samples. Scott-Clayton et al. (2022) reports low take-up for the New York Excelsior scholarship, which converts to a loan for recipients who move out of state after college.

The second structural difference across Promise programs is in the relationship, or lack thereof, between program aid and other sources of aid. Some programs cover a student's tuition from the "first dollar," allowing recipients to apply any additional aid toward supplies, books, and living expenses. Others, like Tennessee Promise, only cover the "last dollar" difference between tuition and a student's other grants and scholarships. There were 23 statewide promises of free college as of 2022, most of which resemble Tennessee Promise's last-dollar funding structure (Campaign for Free College Tuition, 2022). While Promise scholarships tend to have a broader base of eligible students than other forms of aid, last-dollar grants offset very little of the full cost of attending college, particularly for lower income students. The magnitude of effects on degree production and degree completion tend to be larger for the more generous first-dollar programs (El Dorado: Swanson and Ritter (2020); Kalamazoo: Bartik et al. (2021)) than for the local predecessor to Tennessee Promise (Carruthers et al., 2025). Fewer studies have examined long-term outcomes such as earnings, and those that have report little to no discernible change in earnings up to ten years after high school (Carruthers et al., 2025; Hershbein et al., 2021).

Looking across the growing body of research on Promise programs and financial aid more generally, programs with a wider base of eligible students tend to have larger or more consistent effects on college going. This makes intuitive sense, since wide eligibility is more likely to cover more marginal enrollees. Promise students additionally benefit from clear messaging and reduced uncertainty about the tuition cost of college. Another theme, however, is that more generous programs do more to support college completion. This is where the gains from Promise programs are less clear, particularly last-dollar programs like Tennessee Promise.

We add to research on financial aid, and Promise programs in particular, in two ways. First, we extend the timeline of research on Tennessee Promise and its local predecessors to consider the model's effects on associate's and bachelor's degree completion, as well as early labor market and household outcomes. "Free college" may be enough to get more students to enroll in college, but is last-dollar aid enough to help more students get through college? Prior work has been limited to estimated gains in initial enrollment, or longer-term effects of the Promise model's one-county phase. Understanding longer-term outcomes of all phases including the statewide implementation is important to Tennessee as well as many other states that adopted similar initiatives. A related feature of our findings is that they are the first to document effects of a Promise model that scaled from one county's place-based program to all high school graduates in the state. Second, and more broadly, estimated effects of low-barrier but low-cost Promise aid complement what we know about merit-based and need-based financial aid. These other aid vehicles tend to be more generous per student but have eligibility, application, and renewal criteria that limit the number of students who can expect to use the aid. Our MVPF analysis in Section 5 quantifies a core tradeoff of financial aid design: whether extending small tuition grants to many students generates aggregate returns comparable to directing larger awards to a narrower pool.

3 Conceptual Framework

It is worth thinking carefully about the types of students and choices that are affected by this program and how those choices would be reflected in IPEDS or ACS data. Effects will be driven by compliers, those whose choice of whether or where to start higher education is affected by the policy, as well as those whose success in college is affected by financial and non-financial support inherent to Promise. There are two types of compliers on the college choice margin, which we refer to as New Access Enrollees and Alternative Path Enrollees.

New Access Enrollees are individuals who would not have attended any college immediately following high school in the absence of Tennessee Promise given their expected returns and ability to pay. These account for approximately 75% of the post-Promise increase in Tennessee two-year college enrollment (Nguyen, 2020). The remaining 25% is attributed to Alternative Path Enrollees, or individuals who decide to attend a two-year institution instead of a four-year institution due to the decrease in cost and the spotlight that the program places on two-year colleges. New Access and Alternative Path Enrollees represent, respectively, the democratization and diversion pathways into higher education through community colleges (Rouse, 1995).

Both types of college choice compliers, as well as students who would have enrolled in a community college regardless, might also be affected by Promise's tuition grants and non-financial components after they enroll. Based on a large financial aid literature (Dynarski et al., 2023; Nguyen et al., 2019), we expect these supports to at least weakly improve student degree progress through what we will refer to as the Support Channel. In ACS and IPEDS data, the Support Channel would tend to improve postsecondary outcomes, and subsequently improve labor market outcomes to the extent that there is a meaningful return to higher education.

A New Access Enrollee will experience an increase in educational attainment regardless of whether they are successful at the two-year institution. In ACS individual data, their choice to enroll in college will manifest as a higher level of postsecondary attainment. In college-level IPEDS data, we would expect New Access Enrollees to have a neutral-to-positive effect on certificates, associate's degrees, and bachelor's degrees in the absence of countervailing congestion or peer effects.

The effects of Tennessee Promise on Alternative Path Enrollees are more complex, since this group consists of individuals who both may or may not have succeeded by starting at a four-year institution. An Alternative Path Enrollee who would not have succeeded

had they started at a four-year institution may still drop or fail out of the two-year institution without obtaining a degree or certificate, experiencing no change in educational attainment. However, there are many reasons that a would-be four-year student may experience greater success by starting at a two-year institution, including lower costs, career-focused programs, or a more accessible learning environment. In this case, they may obtain an associate's degree or a certificate from their two-year institution, or even a bachelor's degree if starting at a two-year college provides a smoother transition into a four-year college. Therefore, an Alternative Path Enrollee who would not have succeeded by beginning at a four-year institution could experience no change in educational attainment or an increase in educational attainment.

Now consider an Alternative Path Enrollee who would have succeeded by starting at a four-year institution. While Tennessee Promise provides a lower-cost route to a bachelor's degree, the differences in institutional structure, resources, and student life between four-year and two-year institutions may pose challenges. This type of complier might not succeed at a two-year institution, or they might complete an associate's degree or certificate but choose to not continue on and complete a bachelor's degree. It is also possible that this type of complier will transfer to a four-year college after accumulating credits or completing an associate's degree, leading to the same educational attainment as in the counterfactual, or even a higher level of attainment if starting at a two-year school smooths the path to graduate school. The *ex ante* effect of Promise on attainment is therefore ambiguous for Alternative Path enrollees.

This framework highlights the complexity of evaluating the net effects of Tennessee Promise on educational attainment, as potential outcomes vary significantly. This ambiguity, especially regarding the outcomes for Alternative Path Enrollees, suggests that the overall impact of Tennessee Promise on educational attainment could range from positive to neutral or even negative, depending on the individual circumstances of the stu-

dents involved. In addition, compliers and infra-marginal Promise students may have benefited from the financial aid, mentoring, and logistical support provided through Tennessee Promise and its non-profit predecessors. Aggregating across students to the school level further complicates expectations for graduation rates, an important accountability metric for colleges and universities. Therefore, while we have an unambiguous expectation that a program like Tennessee Promise would increase enrollment in two-year schools, and at least weakly increase the number of certificate and associate's degree conferrals, its broader effects on other institutional, educational, and workforce outcomes are uncertain and require further empirical investigation.

4 Estimated Effects on College-Level Outcomes

4.1 College-Level Outcomes: Methods

Descriptive individual enrollment trends in Figure 1 panel D rely on state administrative data connecting Tennessee's K-12 students to their postsecondary National Student Clearinghouse records. Similarly, sector-level enrollment totals in panel B are limited to Tennessee colleges and universities. Since the entire state was ultimately covered by Promise, these data do not offer counterfactual outcomes for "never treated" individuals and institutions, which hinders unbiased identification of dynamic program effects (De Chaisemartin and d'Haultfoeuille, 2020; Goodman-Bacon, 2021).[5] In addition, Tennessee Promise emerged during a broader effort, much of it led by states, to increase college attainment and meet expected labor demand for high-skilled, college-educated workers (Brown, 2023). Tennessee's postsecondary attendance and degree completion trends in the

[5]In an early phase of this project, we used state administrative data linking Tennessee K-12 students to National Student Clearinghouse enrollment records to estimate the effect of county-level access to Knox Achieves, tnAchieves, or Tennessee Promise on the likelihood of enrolling in college immediately after high school. Results were consistent with what we show here using nationally representative data, indicating that tuition-free community college significantly increased the likelihood of going to college.

2010s may have coincided with similar patterns throughout the U.S. We evaluate Promise by comparing outcomes between individuals and schools that were eligible for Tennessee Promise with outcomes from other states and earlier time periods.

The expansion of Promise from one Tennessee county in 2009 to a statewide program in 2015 permits a two-way fixed effects design that exploits changes over time in any given institution's exposure to Tennessee Promise. For college-level outcomes, we estimate the following model using institution-year observations from the Integrated Postsecondary Education Data System (IPEDS):

$$y_{is,t+q} = Promise_{st}\beta + \gamma_i + \gamma_t + \varepsilon_{ist}, \tag{1}$$

where $y_{is,t+q}$ is graduation rate, the log of total certificates or degrees conferred, or the log of total transfers for institution i, first-year cohort t, and state s. $Promise_{st}$ is a continuous measure of the percent of the incoming cohort who were likely eligible for Promise in year t. We link college and university outcomes in year $t+q$ to incoming cohorts through expected time (q) to transfer, credential attainment, or graduation. Specifically, we set $q = 1$ year to estimate the effect of $Promise_{st}$ on total certificates awarded in year $t+1$. We set $q = 2$ years for associate degrees, $q = 2$ years for total transfers, and $q = 4$ years for bachelor's degree awards. Graduation rates within 150% of normal time are measured in the current year but correspond to earlier entry cohorts. We use leads of three years for two-year institutions and six years for four-year institutions. This approach ensures that the timing of outcomes reflects when treated cohorts would be most affected, although results may nonetheless absorb measurement error since aggregate data will obscure the full range of individual pathways. Parameters γ_i and γ_t control for institution and cohort fixed effects.

From 2000–2023 IPEDS data, we limit the sample to public two- and four-year institutions, reflecting both the public-sector focus of Promise eligibility and the greater consis-

tency of outcome reporting in IPEDS for public institutions. For institutions in the state of Tennessee, our measure of Promise exposure is equal to the statewide rate of eligibility for the incoming cohort and ranges from zero to one. Growth in $Promise_{st}$ within Tennessee is depicted in Figure 1 panel A, and is equal to the percent of 12th graders who lived in counties where Knox Achieves, tnAchieves, or Tennessee Promise were active.[6]

We code $Promise_{st}$ as zero for colleges and universities outside of Tennessee. This allows us to isolate the effect of Tennessee's version of tuition-free community college. Tennessee Promise preceded similar state efforts, however, and setting $Promise_{st} = 0$ for all other states understates the extent of Promise-like programs throughout the United States. In some specifications, shown in Figure A1 and A2 in the Appendix, we limit the comparison group to 16 states that did not have their own statewide free-college programs as recorded by the Campaign for Free College Tuition (2022). Estimated confidence intervals tend to be wider for this smaller sample, but unless noted otherwise, results are broadly in line with what we report for the full U.S. Section A.1 of the Appendix discusses results from other variations on Equation 1 that add socioeconomic controls or exclude 2020-21 outcomes, as well as estimated effects of binary Promise adoption using two-way fixed effects and synthetic difference-in-difference identification.

Treatment varies at the state-year level, while outcomes are measured for institutions, a few dozen of which were treated in this construct. We therefore report standard errors clustered at the state level, which allows for arbitrary correlation in outcomes across institutions within a state and over time.

[6]We do not assign Promise exposure at a sub-state level in the IPEDS analysis, as eligibility is based on students' counties of residence rather than institutional location, and IPEDS does not provide information on students' counties of origin. We use the same treatment assignment rule in the Section 5 analysis of individual outcomes.

4.2 College-Level Outcomes: Results

Table 1 reports estimates of Equation 1 for institution-level outcomes using IPEDS data from 2000-2023 separately for public two-year and four-year institutions. Increased Promise exposure is associated with a statistically significant decline in graduation rates for two-year institutions (Panel A). A one-unit increase in $Promise_{st}$ reduces the graduation rate by 6.2 percentage points, or approximately 21 percent of the comparison mean. At the same time, Promise exposure increases associate's degree production. The estimated coefficient of 0.144 implies an increase of roughly 15 percent. The estimated effect on total certificates conferred is negative and economically meaningful in magnitude, implying a roughly 11 percent decline, though the estimate is imprecise and not statistically distinguishable from zero.[7] The number of transfer-out students increases by a large amount with an estimated coefficient of .215, or approximately 24 percent. This pattern is consistent with students initially enrolling in two-year institutions to take advantage of the zero-tuition margin, then transferring to a four-year institution, effectively substituting towards a lower-cost bachelor's degree pathway.

Panel B reports results for four-year institutions. We find no statistically significant effect of Promise exposure on graduation rates at four-year schools. Transfer students are not included in the adjusted cohort used to calculate four-year graduation rates, so this finding tells us something about the composition of Alternative Path students relative to those who would have started college in a four-year school with or without Promise. Since graduation rates are not significantly different for four-year "always-takers," we can infer that Alternative Path students, as a group, were not differentially more or less likely to complete a four-year degree. Estimated coefficients for bachelor's degree awards are small

[7] We estimate approximately no change in certificates when we exclude states with their own Promise programs from the control group (see Figure A1). It is possible that other statewide programs were relatively more effective than Tennessee Promise at increasing certificate receipt, or that other Promise program designs emphasized certificate pathways to a greater degree.

and precisely estimated around zero. In contrast, Promise exposure is associated with a statistically significant 8-9 percent increase in transfer-in students. Taken together with the increase in transfer-out from two-year institutions, this suggests that some students are sequencing their postsecondary education by starting at a two-year institution before enrolling in a four-year institution, rather than starting at a four-year institution, as a result of Promise.

Viewed through the conceptual framework, this combination of results is consistent with expanded access to and selection of community college pathways through enrollment of New Access Enrollees and Alternative Path Enrollees. New Access Enrollees, who would not have attended college in the absence of Promise, may contribute disproportionately to lower measured graduation rates if they are less likely to complete within 150 percent of normal time. Some Alternative Path students may have also depressed graduation rates by transferring without an associate's degree. At the same time, increased associate's degree production suggests that a large subset of marginal students successfully complete two-year degrees. The Support Channel could be at work in two-year schools as well, for both marginal and counterfactual two-year enrollees. Gains in associate degrees and transfers did not translate into a significantly larger number of bachelor's degrees. Nevertheless, imprecisely positive effects on four-year completion suggests taking the two-year college route to a bachelor's degree was successful, in the aggregate, for Promise students. These patterns provide important context for the individual-level analysis that follows, where we examine how these pathways translate into enrollment, attainment, and early-career labor market outcomes.

5 Estimated Effects on Individual-Level Outcomes

5.1 Individual-Level Outcomes: Methods

To get a more direct sense of individual responses to Promise, we turn to the Census Bureau's American Community Survey (ACS). The ACS allows us to evaluate Promise in terms of individual postsecondary attainment, which was the intended outcome of Tennessee Promise and Drive to 55 more generally. ACS data also allow us to fine-tune treatment assignment at the cohort level, study degree completion beyond 150% of normal time, and analyze the effect of Promise on labor market and household outcomes.

We study effects of the same 2009-2015 expansion of the Promise model as in Section 4, but for state-year-age aggregations derived from the ACS:

$$y_{ast} = Promise_{ast}\beta + Age_a\delta + \gamma_s + \gamma_t + \varepsilon_{ast}, \tag{2}$$

where y_{ast} is average postsecondary enrollment or attainment rates for individuals at time t, from age/cohort a and state s. State-year-age averages are computed from individual responses using ACS person weights. $Promise_{ast}$ is a continuous measure of the percent of the cohort eligible for Promise at age 17. The ACS is a year-round survey, and we cannot align ACS years with academic years or pinpoint the reference period respondents have in mind when reporting postsecondary enrollment. This introduces measurement error in $Promise_{ast}$ for individuals of the same age but different high school classes. To address this and increase sample sizes, we group adjacent ages a and $a+1$, from 18–19 through 23–24, and estimate Equation 2 for these cohorts. Age_a is an indicator for the younger age in each pair, and γ_s and γ_t are state and survey year fixed effects.

Using 2000–2024 one-year ACS microdata (Ruggles et al., 2025), we restrict the sample to high school graduates ages 18–24. For Tennesseans, defined using state of residence

one year prior, $Promise_{ast}$ equals the statewide eligibility rate at age 17.[8] As in Section 4, within-state variation reflects the share of 12th graders living in counties where Knox Achieves, tnAchieves, or Tennessee Promise operated (Figure 1, panel A).[9] Preferred models set $Promise_{ast}$ to zero for ACS respondents in other states, but we test the robustness of our findings to specifications that exclude other states with their own Promise programs (see Figure A5 in the Appendix).

We estimate the effect of Promise on seven postsecondary outcomes for ACS respondents, each aggregated to the state-year-age level using ACS person weights. These include a binary indicator equal to one for individuals who were enrolled in postsecondary education during the 3-month ACS reference period, as well as three measures of exact educational attainment: Some college without a degree, associate's degree, or bachelor's degree. The ACS does not record multiple degrees, so exact attainment obscures potential effects on earning an associate's degree on the way to a bachelor's or graduate degree. With this in mind, we additionally estimate effects of Promise on the likelihood of having some college or any degree, an associate's or higher degree, or a bachelor's or higher degree.

The ACS includes a number of outcomes describing work, earnings, and families. We apply Equation 2 to a binary indicator of labor force participation, log occupation score, log income from wages and salaries, and log total income (which adds investment, business, transfer, and other sources of income to wages and salaries). Labor force participants are ACS respondents who report that they are working or looking for work. We compute an individual's occupation score to be weighted average income among all ACS respondents in the U.S. sample for a given year who reported having the same occupation. We estimate both wage/salary income and total income in recognition of the possibility that

[8] We do not observe state of residence at age 17 for 19-24-year-olds. Alternate specifications described in the Appendix include a model that limits Equation 2 to individuals who were living in their state of birth.

[9] We do not refine $Promise_{ast}$ to the sub-state level using metro areas, as program expansion occurred at the county level.

Promise may increase the likelihood of wage and salary work at the expense of other income channels, including social safety net transfers. In order to understand the effect of Promise on family formation, our final two ACS outcomes are marriage and having one or more dependent children in the household.

Standard errors from Equation 2 can be severely underestimated when there is one treated group (Conley and Taber, 2011; Ferman and Pinto, 2019; MacKinnon et al., 2023), as is the case here with one treated state. In results to follow, we make inferences about the statistical significance of $Promise_{ast}$ coefficients from 1,000 permutations of $Promise_{ast}$ values to other states and times.

5.2 Individual-Level Outcomes: Results

5.2.1 Main Results

Table 2 reports Equation 2 results for four postsecondary outcomes. First, we estimate that access to tuition-free community college through Tennessee's Promise model significantly increases the likelihood that an 18-19-year-old high school graduate is enrolled in college. The 5.4 percentage-point gain in postsecondary enrollment (8.9% of the counterfactual mean) is just below state reports of a 5.9-point 2014-2015 increase in college going following statewide Promise implementation (Tennessee Higher Education Commission, 2024b) and seen in Figure 1. Postsecondary enrollment remains elevated 1-2 years after high school, although 1.6 percentage-point higher rates of enrollment for 19-20-year-olds are statistically insignificant. Older individuals, age 20-24, are not more or less likely than the counterfactual to be in college if they had access to Promise as 17-year-olds.

At the margin, a student who chooses college because of Promise over work, the military, or other opportunities might be less likely to complete college with a credential that helps them recover the indirect and direct (non-tuition) costs of college. Section 4 results

suggest that this channel may have decreased graduation rates at eligible two-year colleges in Tennessee. In the ACS, this would manifest as a higher likelihood of "some college, no degree" educational attainment, which tends to have a very uncertain lifetime return (Webber, 2024; Carruthers et al., 2023). The second block of Equation 2 results in Table 2 indicates that Promise eligibility increases the likelihood of "some college, no degree" among 18-19-year-olds, an age at which many are still enrolled in college and pursuing degrees. This effect does not persist, and for older individuals there is no significant effect of Promise eligibility on the likelihood of some college without credential completion. There is, however, a more persistent effect of Promise on having some college *or* a degree, as shown in the third block of Table 2 results. We estimate that a 23-24-year-old is 3.5 percentage points more likely to have at least some college if they were eligible for Promise, the same magnitude increase as when they were 18-19.

The fourth block of Table 2 results suggests that Promise eligibility significantly increases associate's degree attainment by 1.3 percentage points at age 19-20 (in alignment with the normal, two-year time to degree), rising to 3.1 percentage points at age 20-21. These are large effects, measuring 46-53% of expected associate's attainment among 19-21-year-olds.

The higher likelihood of associate's attainment attenuated to 1.7 percentage points at age 22-23 and was no different than zero by age 23-24. There are a couple explanations for tapering effects on associate's attainment. First, perhaps Promise accelerated college enrollment and completion from the mid-20s to the years immediately following high school. In this scenario, there is no net gain in educational attainment and no net progress toward the state's Drive to 55 objectives, although students may benefit from completing college at a somewhat younger age when their opportunity cost is lower. Another possibility is that Promise increased the likelihood that students earned an associate's degree on the way to a bachelor's or higher degree, and that we would only observe the highest attainment in the

ACS. The fifth block of results in Table 2 reports estimated effects of Promise on having at least an associate's degree, and results are more consistent with the second narrative. Promise eligibility at age 17 increases the likelihood of having an associate's or higher degree by 4.0 percentage points at age 23-24, or 10.5% of the control mean.

The last two blocks of Table 2 report Equation 2 estimates for bachelor's degree attainment. Prior expectations on how free community college may have affected four-year degree attainment are unclear for reasons described in Section 3. Promise increased college going and reduced the sticker price of the first two years of college, and so may have likewise increased bachelor's degree completion down the road (New Access and Support channels). The program incentivized the two-year college pathway, however, and bachelor-bound students would have had to navigate a transfer to a four-year college or university (Alternative Path channel). A large volume of research has documented a lower likelihood of four-year completion for students who start college in a 2-year school (Scott-Clayton, 2015; Schudde and Jabbar, 2024), and Figure 1 panel B documents at least a short-term reduction in four-year college going after the statewide implementation of Promise. Nonetheless, Equation 2 indicates little change in bachelor's degree receipt by age 24. If anything, Promise may have increased bachelor's degree attainment several years after high school. The 2.3-2.7-point estimated increase shown in Table 2 Column (6) is at best weakly significant but consistent with results for associate's or higher attainment, and with what Carruthers et al. (2025) found for the one-county "Knox Achieves" phase of Promise. Knox Achieves likewise had an imprecisely positive relationship with four-year college completion several years later.

Table 3 reports Equation 2 results for work, income, and household outcomes. Promise may affect early-career labor market and household formation through its effect on college enrollment and degree attainment, which could alter job quality, earnings, and the timing of family formation.

We first examine labor force participation and find no evidence that Promise eligibility changed the likelihood of working or searching for work. We next consider occupation score. Because earnings immediately after college can be unreliable signals of longer-term labor market success (Minaya and Scott-Clayton, 2018), occupation score provides an alternative measure by representing job quality in terms of average earnings across all experience levels. Even in the short run, this may do a better job detecting if eligible students are on more favorable income trajectories. Additionally, we might expect general equilibrium effects of the college-work substitution to be concentrated at the bottom of the job ladder, and to have less bearing on a cohort's ability to find work above the entry level. Results in Table 3 indicate no detectable effect of Promise eligibility on occupation score among affected cohorts.[10]

Nevertheless, the next two blocks of Table 3 indicate that Promise increased individual income by approximately 7-8 percent. Estimated effects are largest over ages 20-22 and taper somewhat to a weakly significant level by age 24. Promise may have improved within-occupation earnings without moving more individuals into work or into better paying jobs. However, we urge caution in attributing Promise with 7-8% gains in cohort-wide income, given that we observe higher rates of college going for only 5.4% of eligible cohorts. The implication is that the return to college is at least 130% at age 22 for these marginal students, far more than typical estimates.

The final blocks of Table 3 consider the effect of Promise on household formation, measured by the likelihood of being married and likelihood of having at least one dependent child. Access to Promise may affect these outcomes through several channels. Increased college enrollment and degree completion may delay family formation by extending time spent in school or increasing the opportunity cost of marriage and childbearing at young ages. Duflo et al. (2025) and Bloem and Villero (2024) provide evidence of this channel in

[10] We also find no change in occupation score derived from early career workers (Appendix Table A1).

developing economies. Additional schooling may also improve marriage market prospects, leading individuals to postpone family formation until after degree completion. Estimates in Table 3 indicate that Promise eligibility may be associated with a lower likelihood of being married or having a child in early adulthood. These patterns are consistent with delayed transitions into family formation among eligible cohorts, although we show in the Appendix that these results are somewhat more sensitive than others to specification (see Figure A8).

Looking across Table 2 and Table 3 findings, the results suggest that Promise primarily affected the timing of schooling, work, and possibly family formation during the transition to adulthood. Eligible cohorts appear to spend more time in postsecondary education and less time in early family roles, with some evidence of higher income in the short run despite no change in labor force participation or job quality.

Next, we estimate Equation 2 by gender, race, and metro area residence. Figure 3 documents positive effects of Promise on postsecondary enrollment for each subgroup at age 18-19, at or exceeding 5.0 percentage points, declining to par or lower-than-expected rates of enrollment by age 23-24. Age 18-19 gains in enrollment were larger for Nonwhite than White ACS respondents, and for respondents living outside of metro areas. Nonwhite individuals also exhibited larger declines in enrollment over ages 20-23, and the largest concurrent gains in marriage. Turning to degree attainment by subgroup in Figure 4, we find that Nonwhite students had lower and less precise gains in 2-year college completion than the other five subgroups, as well as imprecisely lower rates of four-year college completion by age 23-24. Women were entirely responsible for the weakly positive effects on bachelor's degree attainment that we document in Table 2. By age 23-24, Promise-eligible women were 4.1 percentage points more likely to have at least a bachelor's degree (with a 0.058 permutation p-value), compared with a statistically insignificant 1.2-point gain for men.

Equation 2 effects on income and occupation score by subgroup are shown in Figure 5. Estimated effects are positive over all ages we observe for each subgroup, but confidence intervals are usually imprecise enough to include zero. Males and metro area residents are exceptions to that pattern. Both exhibit significantly higher log income at age 20, as in Table 3. Promise students in more urban areas (when surveyed) may have been in a better position to capitalize on newly acquired associate's degrees, although that advantage does not appear to have persisted into their mid-20s. Instead, we find that age 22-24 income gains are driven by Promise students living in non-metro areas.

5.2.2 Marginal Value of Public Funds

The marginal value of public funds (MVPF) for Promise is the ratio of participants' willingness to pay to government costs (Hendren and Sprung-Keyser, 2020). We derive the MVPF of Promise under the assumption that willingness to pay for Promise is the average tuition discount for students who utilized Promise but would have enrolled in postsecondary education regardless and estimated additional income, net of taxes, for students induced to enroll in postsecondary education by Promise.

From 2019-20 through 2022-23, Promise scholarship outlays averaged $28 million per year (Tennessee Higher Education Commission, 2024b), or about $600 per participant, per semester. We calculate average Promise costs by assuming participants receive $1,200 per year over the possible length of program participation of 2.3 years for a total Promise cost per student of $2,760. We discount this value by 3% annually to a $2,711 lump sum as if the money were instead given to students at the beginning of the program. Estimates of additional lifetime income are taken from estimated returns to postsecondary education in Tennessee (Carruthers, 2023). We apply a flat tax rate of 26%, which is calculated based on counterfactual income of individuals with only a high school diploma or less. Putting these pieces together, estimated willingness to pay for Promise is $72,837, which we can

think of as the amount of an unconditional transfer at age 18 that would make a student indifferent between having or not having access to Promise.

On the public cost side of the ledger, we start again with $2,760 per student direct spending on scholarships. We also account for additional expenditures on students who were induced to enroll in postsecondary education as a result of Promise. We calculate additional expenditures by summing total state and local support with total financial aid per full-time equivalent student (State Higher Education Executive Officers Association, 2025). This is equal to $32,345 during the time a student is utilizing Promise and an additional $51,548 for the induced students who went on to receive bachelor's degrees.[11] Average cost per Promise student is calculated to be $14,793. This value is fairly low because most Promise students would have enrolled in higher education even in the absence of Promise, so they only incur the additional cost of $2,760. We then account for additional tax revenues paid by individuals who increased educational attainment as a result of Promise, which we estimate to be $24,845 over a lifetime across all Promise students. This leaves us with a net cost of -$10,053.

The resulting MVPF from this exercise is ∞ with a confidence interval of [∞,∞], which is a result of the negative net cost. An infinite MVPF implies that individuals value the benefits generated by the policy so highly that each $1 of public spending produces positive benefits without any net government cost, effectively making the policy infinitely valuable relative to the public funds used. A favorable MVPF is typical for programs targeted at "College Children" in Hendren and Sprung-Keyser (2020).

We left a number of elements out of the Promise MVPF computation that would likely increase willingness to pay further or decrease public cost. Willingness to pay, for example,

[11] Additional expenditures are attributed to two-year institutions and four-year institutions by using the average breakdown of aid expenditures by institution sector in the Higher Education Finance: Expenditures & Costs handbook (Leaser and Strange, 2025). We assume that average time to a bachelor's degree is 5 years, or an additional 2.7 years after the original 2.3 years on Promise.

excludes any value that students place on knowing the tuition cost of college with certainty (Burland et al., 2023) as well as any spillover benefits in the form of higher pay for untreated Tennesseans (Bartik and Miller-Adams, 2026). We also excluded any net savings in public expenditures from students who started college in two-year schools rather than four-year schools because of Promise. This substitution has been found in related work on phases of Tennessee Promise (Carruthers and Fox, 2016; House and Dell, 2020) but cannot be discerned in the ACS, and does not appear to have altered trends in four-year degree receipt. Additionally, we only account for degrees attained by age 24, but it is possible some Promise students will later complete a college degree.

The MVPF estimates presented here should nonetheless be interpreted with caution, as they rely on assumptions about the returns to additional education and the fiscal costs associated with induced enrollment. In particular, the calculation applies average returns to education to students induced into college by Tennessee Promise, whose returns may differ from those of inframarginal students. While some evidence suggests that marginal returns to postsecondary education can be positive and substantial (Mountjoy, 2022, 2024), these quantities are not directly identified in our setting and may vary depending on completion and subsequent labor market outcomes. In addition, the MVPF depends on assumptions about program-induced public expenditures and tax treatment. If the returns to education for induced students or the associated fiscal costs differ from these assumptions, the implied MVPF would be correspondingly affected.

5.2.3 Placebo Specifications

Tables 4 and 5 report Equation 2 results for the estimated effect of $Promise_{ast}$ at age 22 on outcomes of interest between age 22-23 and 28-29. This is largely a falsification test, since 22-year-olds were not eligible for the Tennessee Promise tuition guarantee, application assistance, or mentoring that was targeted at traditional-aged students moving directly from

high school to college. Age 22 individuals also would not have been eligible for Tennessee Reconnect, which was introduced at the same time as Tennessee Promise and provided a tuition guarantee to nontraditional students enrolling in one of the state's non-degree technical colleges.[12] It is possible, however, that 22-year-olds were nonetheless affected by the Tennessee Promise message and enthusiasm surrounding the state "changing the conversation" about college (Tennessee Office of the Governor, 2016), or that institutional responses to the Drive to 55 campaign had their own effects on ineligible students. Effects of Promise on this slightly older population will help us gauge the extent to which our main results might be driven by student responses to the Promise environment rather than eligibility for program benefits.

We find little to no placebo effects of gains in $Promise_{ast}$ availability at age 22 on college enrollment, college attainment, labor market outcomes, or household formation. Two exceptions are a significantly higher likelihood of at least some college at age 23-24, by 3.4 percentage points, and imprecisely higher rates of associate's or higher attainment at age 23-24, by 2.5 percentage points. These might reflect spillover effects of Tennessee Promise, but they are not sustained into later ages or accompanied by higher rates of enrollment, both of which are apparent for Promise-eligible students.

Within-state variation in Promise exposure at age 22 is also linked with higher individual income at age 27-29: by 10-11 log points for wages and salaries and 13-14 for total income. Only one out of four age 27-29 coefficients are statistically significant, but nonetheless, these are large estimated pay gains. This reinforces our caution about Table 3 results for the estimated effect of Promise at age 17 on income across ages 20-24. Tennessee's labor market may have improved for young adults in parallel with the Promise rollout, and not entirely due to that rollout.

[12]Reconnect was limited to 25+ students enrolling in technical colleges from 2015-2017, expanded to cover 25+ students in community colleges in 2017, and expanded to cover 23+ students in 2022. We omit ACS years 2022-2024 from the falsification exercise.

6 Conclusion

In 2015, Tennessee Promise became the first statewide model of "free college" in the United States in over 50 years. Promise was extraordinarily well received in Tennessee,[13] and early indicators of success in terms of college going motivated similar programs in other states as well as recurring federal proposals for free community college (Smith, 2017). The model was not without criticism, however, founded in concerns about low student success rates in community colleges, the difficulty of transferring community college credits toward higher degrees, financial effects on four-year schools, and last-dollar funding that allocated more aid to higher income students (National Review Editors, 2015; Semuels, 2015; Quinton, 2019).

Nine years after statewide Tennessee Promise, and 15 years after the single-county introduction of the program that grew to become Tennessee Promise, we find strong evidence that the program increased college enrollment among new high school graduates and raised associate's degree attainment, with weakly significant evidence of higher bachelor's degree attainment and no indication of diversion away from four-year completion. At the institution level, Promise expanded access to community colleges while lowering measured graduation rates at two-year institutions, consistent with the enrollment of more marginal students, and increased transfer into four-year schools without reducing bachelor's degree production. Individual-level results likewise indicate higher associate's degree attainment and weakly positive effects on bachelor's degree or higher attainment, suggesting that Promise altered the timing and pathway of postsecondary education without reducing overall attainment, and may have modestly increased four-year completion. Beyond education, we find suggestive evidence of higher early-career income and delayed mar-

[13] A poll of registered voters found 86% support for Promise, shortly after the program was proposed (Vanderbilt University, 2014).

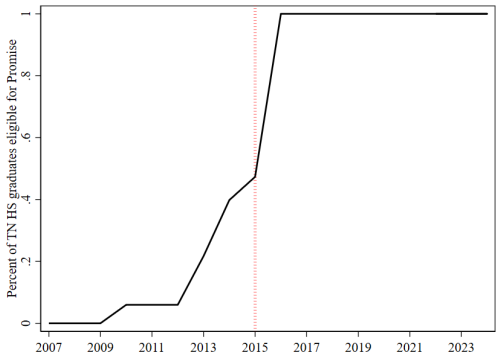
riage and childbearing, along with little change in labor force participation or occupation score.

Under reasonable assumptions about the returns to additional college degrees, we estimate that Tennessee Promise delivered benefits that likely exceeded its public costs, despite modest per-student spending. Even under conservative assumptions, the marginal value of public funds compares favorably to other postsecondary aid programs, many of which provide more funding per student to a narrower base of eligible individuals. Taken together, the results indicate that a simple, last-dollar tuition guarantee tied to community colleges can expand access and increase two-year degree completion without evidence of harm to four-year attainment, and with marginally significant evidence of gains in bachelor's degree completion, even when implemented at scale. At the same time, the findings highlight the importance of policy design, as changes in pathways, timing, and institutional responses appear to be central to how Promise affected student outcomes.

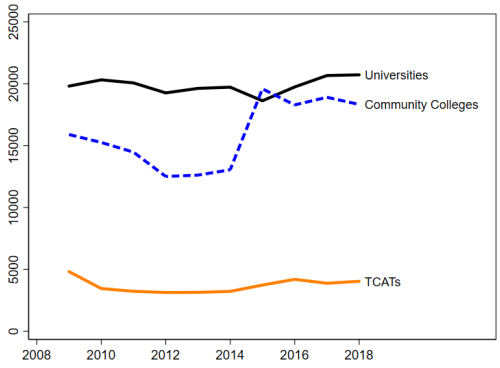
Two limitations point to directions for future research. First, our analysis focuses on outcomes observed in early adulthood and cannot fully determine whether Promise increased long-run earnings or primarily shifted the timing of schooling and labor market entry. Longer-term data will be needed to evaluate whether early gains in attainment translate into sustained improvements in employment and income. Second, we study one particular model of tuition-free college. Although many state Promise programs resemble Tennessee's last-dollar, community-college-focused design, they differ in eligibility rules, funding structure, post-college requirements, and the consistency of these aspects from one year to the next. Understanding how these design features shape student outcomes remains an important question as free college proposals continue to evolve.

Figure 1. Trends in Promise expansion and college enrollment

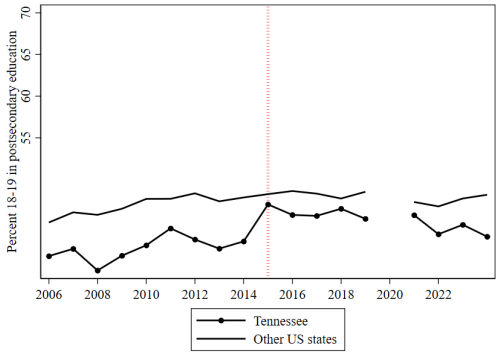
A. Percent of high school graduates eligible for Promise (state administrative data)



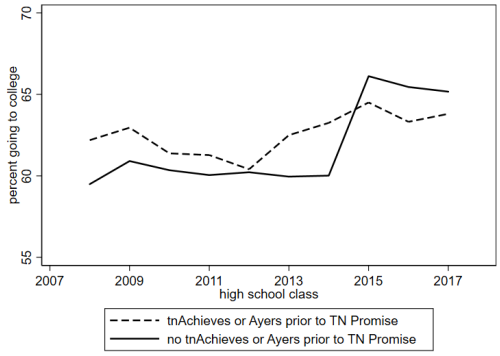
B. First-time, full-time enrollment by Tennessee higher education sector (IPEDS)



C. Percent of 18-19-year-old high school graduates enrolled in higher education (ACS)



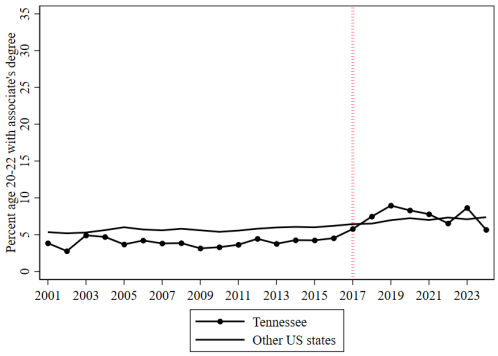
D. Percent of new high school graduates enrolling immediately in college (state administrative data)



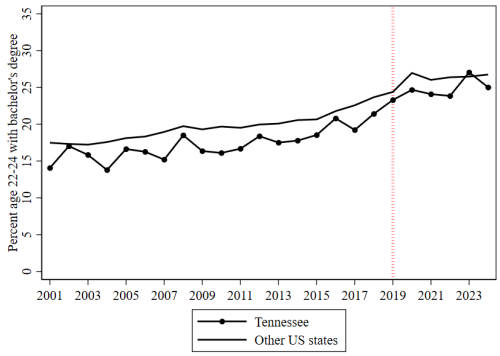
Notes: Authors' calculations. Panel A depicts, by 12th grade cohort, the percent of public high school graduates in counties where tuition-free community college was available through Knox Achieves, tnAchieves, or Tennessee Promise. Panel B plots the volume of first-time, full-time postsecondary enrollment in Tennessee public higher education institutions, by sector and year, according to IPEDS. Panel C plots the rate of postsecondary school attendance among 18-19-year-old high school graduates in the ACS, using Census person weights. "Tennessee" and "Other US state" location is assigned according to where respondents lived one year prior to taking the ACS. Panel D plots, by 12th grade cohort and pre-2015 availability of tuition-free community college, rates of seamless college enrollment observed in National Student Clearinghouse records linked to state administrative K-12 records.

Figure 2. Associate's and bachelor's degree attainment among young adults, Tennessee compared with other states

A. Percent age 20-22 with associate's degrees



B. Percent age 22-24 with bachelor's degrees



Notes: Authors' calculations using the ACS and person weights. "Tennessee" and "Other US state" location is assigned according to where respondents lived one year prior to taking the ACS. Vertical lines are placed at 2015 plus the normal time to degree: 2 years for associate's degrees, and 4 years for bachelor's degrees.

Table 1. Institutional outcomes

Panel A: Two-year institutions

	Graduation rate	Log associates	Log certificates	Log transfer-out
$Promise_{ast}$	-0.062***	0.144*	-0.120	0.215***
	(0.007)	(0.070)	(0.084)	(0.043)
Observations	16,845	15,791	16,757	14,751
Control mean	0.292	5.988	5.359	4.245

Panel B: Four-year institutions

	Graduation rate	Log bachelors	Log transfer-in
$Promise_{ast}$	-0.004	0.018	0.082*
	(0.012)	(0.029)	(0.034)
N	9,669	11,247	9,887
Control mean	0.502	7.028	6.260

Notes: Authors' calculations using Equation 1 applied to IPEDS data. Standard errors are in parentheses and are clustered at the state level. Statistical significance: *0.10 **0.05 ***0.01. Outcomes differ by institution type. Panel A reports two-year outcomes (graduation rate within 150% of normal time, associates degrees conferred, certificates conferred, transfer-out students). Panel B reports four-year outcomes (graduation rate within 150% of normal time, bachelors degrees conferred, transfer-in students).

Table 2. Postsecondary outcomes

	(1)	(2)	(3)	(4)	(5)	(6)
Age	18-19	19-20	20-21	21-22	22-23	23-24
			Postsecondary enrollment			
$Promise_{ast}$	0.054***	0.016	-0.004	-0.003	-0.021	-0.018
	(0.004)	(0.004)	(0.005)	(0.005)	(0.004)	(0.003)
Control mean	0.609	0.618	0.557	0.476	0.361	0.268
Permutation p-value	0.000	0.138	0.758	0.848	0.164	0.234
			Some college, no degree (exact)			
$Promise_{ast}$	0.033***	0.018	-0.006	0.000	-0.001	-0.004
	(0.004)	(0.004)	(0.005)	(0.005)	(0.004)	(0.003)
Control mean	0.438	0.547	0.541	0.464	0.363	0.305
Permutation p-value	0.008	0.182	0.654	0.972	0.974	0.836
			Some college, no degree (at least)			
$Promise_{ast}$	0.035**	0.032**	0.025**	0.027*	0.028*	0.035**
	(0.004)	(0.004)	(0.004)	(0.003)	(0.004)	(0.004)
Control mean	0.449	0.580	0.622	0.646	0.671	0.685
Permutation p-value	0.014	0.020	0.044	0.050	0.058	0.034
			Associate's degree attainment (exact)			
$Promise_{ast}$	0.002	0.013***	0.031***	0.029***	0.017*	0.012
	(0.001)	(0.001)	(0.002)	(0.002)	(0.002)	(0.002)
Control mean	0.009	0.028	0.058	0.078	0.085	0.088
Permutation p-value	0.330	0.004	0.000	0.002	0.076	0.198
			Associate's degree attainment (at least)			
$Promise_{ast}$	0.002	0.014**	0.031***	0.026*	0.029*	0.040**
	(0.001)	(0.002)	(0.003)	(0.003)	(0.004)	(0.004)
Control mean	0.010	0.033	0.081	0.182	0.307	0.380
Permutation p-value	0.426	0.010	0.002	0.058	0.072	0.022
			Bachelor's degree attainment (exact)			
$Promise_{ast}$	-0.001	0.001	0.000	-0.001	0.010	0.023
	(0.000)	(0.000)	(0.001)	(0.002)	(0.003)	(0.004)
Control mean	0.001	0.005	0.021	0.101	0.212	0.268
Permutation p-value	0.390	0.584	0.868	0.908	0.430	0.128
			Bachelor's degree attainment (at least)			
$Promise_{ast}$	-0.001	0.001	1.0E-5	-0.002	0.012	0.027*
	(0.000)	(0.000)	(0.001)	(0.002)	(0.003)	(0.004)
Control mean	0.001	0.005	0.023	0.104	0.222	0.292
Permutation p-value	0.550	0.496	0.962	0.872	0.318	0.078

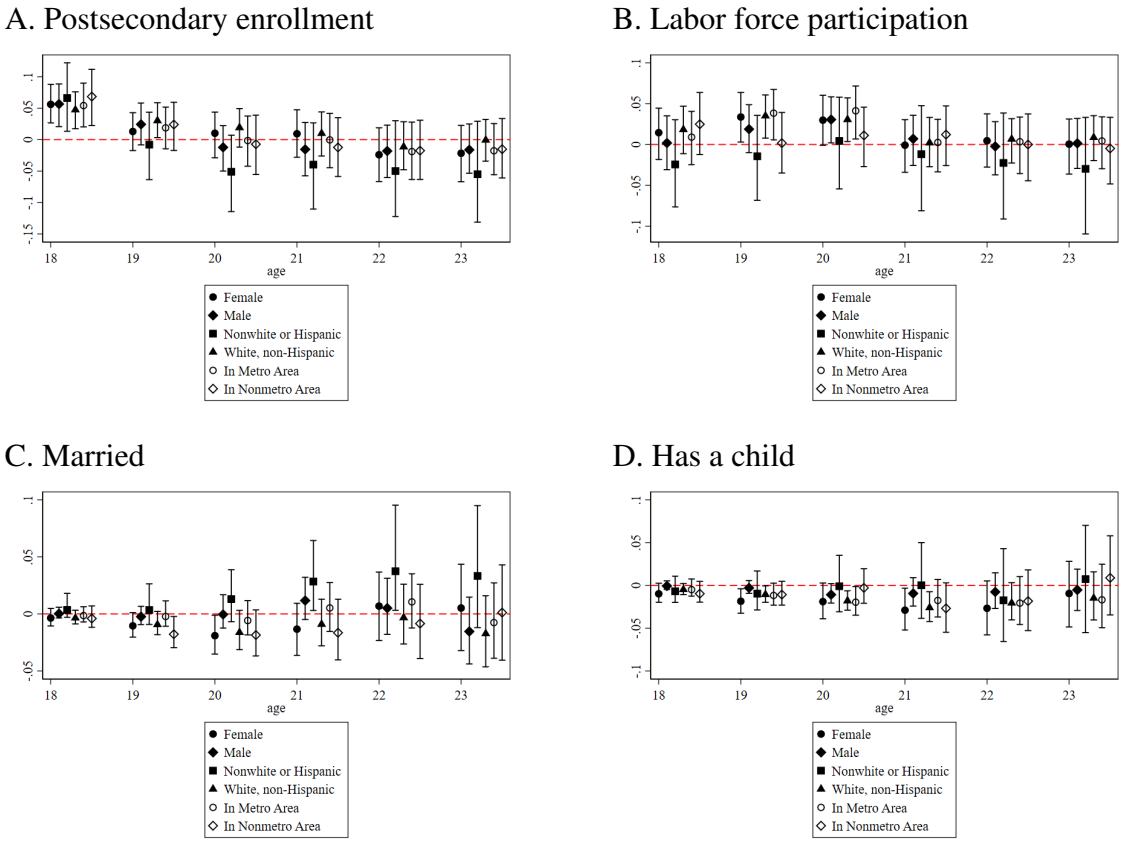
Authors' calculations using Equation 2 applied to the ACS. Clustered standard errors are in parentheses. N = 2,448 state-age-years. Statistical significance from permutation: *0.10 **0.05 ***0.01.

Table 3. Income and household outcomes

	(1)	(2)	(3)	(4)	(5)	(6)
Age	18-19	19-20	20-21	21-22	22-23	23-24
			Labor force participation			
$Promise_{ast}$	0.008	0.017	0.017	-0.007	0.000	-3.4E-6
	(0.004)	(0.004)	(0.004)	(0.003)	(0.002)	(0.002)
Control mean	0.612	0.679	0.731	0.769	0.810	0.838
Permutation p-value	0.564	0.156	0.164	0.488	0.974	0.996
			Log occupation score			
$Promise_{ast}$	0.024	-0.001	0.013	0.007	-0.011	-0.018
	(0.006)	(0.005)	(0.004)	(0.005)	(0.005)	(0.005)
Control mean	9.860	9.996	10.115	10.235	10.370	10.473
Permutation p-value	0.348	0.954	0.562	0.838	0.648	0.438
			Log individual income from wages and salary			
$Promise_{ast}$	0.072	0.052	0.077**	0.072**	0.068*	0.065*
	(0.015)	(0.014)	(0.012)	(0.010)	(0.011)	(0.011)
Control mean	8.803	9.193	9.483	9.689	9.923	10.130
Permutation p-value	0.110	0.168	0.026	0.038	0.080	0.058
			Log total individual income			
$Promise_{ast}$	0.030	0.037	0.071**	0.069*	0.068*	0.067*
	(0.014)	(0.013)	(0.011)	(0.010)	(0.011)	(0.010)
Control mean	8.913	9.272	9.552	9.755	9.985	10.190
Permutation p-value	0.426	0.344	0.038	0.060	0.056	0.082
			Married			
$Promise_{ast}$	-0.012***	-0.015***	-0.015**	-0.012	-0.007	-0.010
	(0.001)	(0.002)	(0.003)	(0.003)	(0.004)	(0.005)
Control mean	0.015	0.031	0.056	0.090	0.132	0.179
Permutation p-value	0.000	0.002	0.036	0.218	0.562	0.522
			Has a child in the household			
$Promise_{ast}$	-0.011***	-0.013**	-0.016**	-0.018**	-0.014	-0.006
	(0.001)	(0.001)	(0.002)	(0.002)	(0.003)	(0.003)
Control mean	0.024	0.043	0.071	0.103	0.138	0.177
Permutation p-value	0.008	0.010	0.024	0.032	0.244	0.726

Authors' calculations using Equation 2 applied to the ACS. Clustered standard errors are in parentheses. N = 2,448 state-age-years. Statistical significance from permutation: *0.10 **0.05 ***0.01.

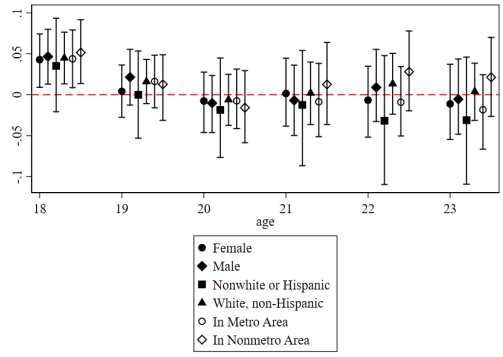
Figure 3. Individual and household status: Subgroups



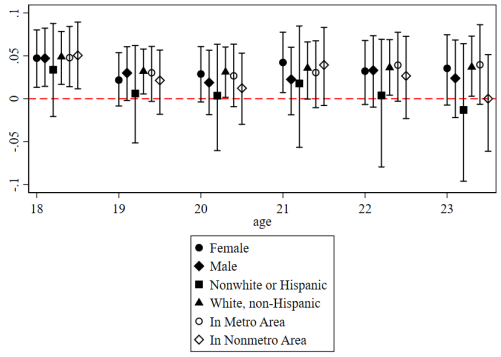
Notes: Authors' calculations using Equation 2 applied to the ACS. In each panel, each point represents a $\hat{\beta}$ estimate for the effect of $Promise_{ast}$ on the outcome indicated in panel headings, and for the indicated subgroup, with 95% confidence intervals derived from permutation.

Figure 4. Postsecondary outcomes: Subgroups

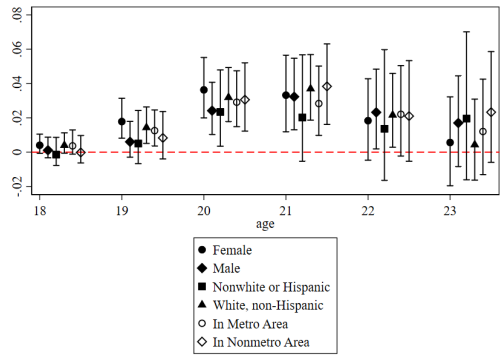
A. Some college, no degree (exact)



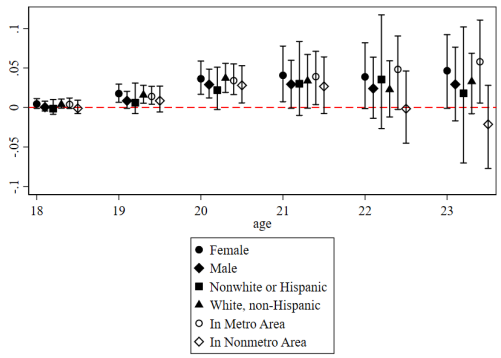
B. Some college, no degree (at least)



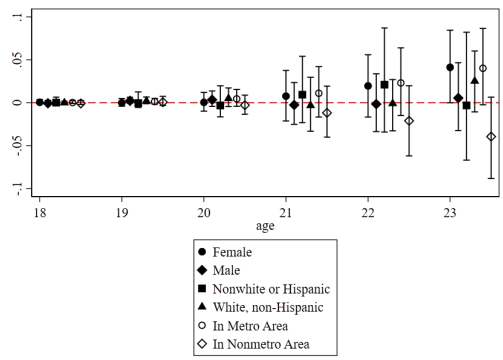
C. Associate's degree (exact)



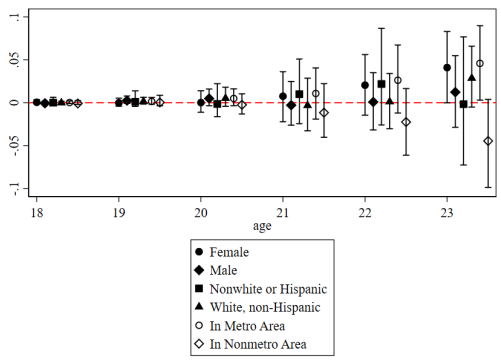
D. Associate's degree (at least)



E. Bachelor's degree (exact)



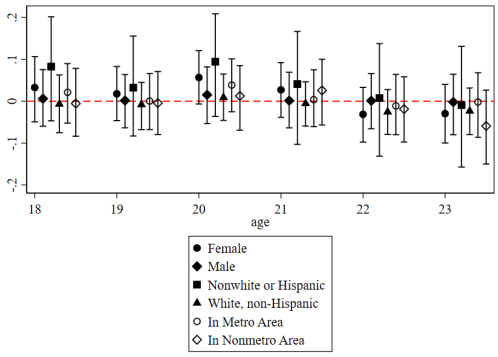
F. Bachelor's degree (at least)



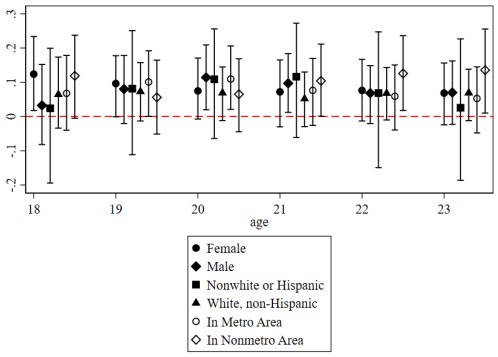
Notes: Authors' calculations using Equation 2 applied to the ACS. In each panel, each point represents a $\hat{\beta}$ estimate for the effect of $Promise_{ast}$ on the outcome indicated in panel headings, and for the indicated subgroup, with 95% confidence intervals derived from permutation.

Figure 5. Income outcomes: Subgroups

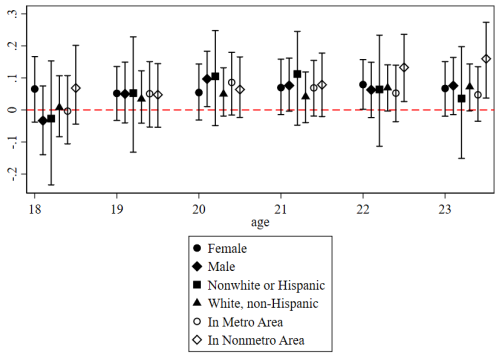
A. Log occupation score



B. Log individual wage and salary income



C. Log total individual income



Notes: Authors' calculations using Equation 2 applied to the ACS. In each panel, each point represents a $\hat{\beta}$ estimate for the effect of $Promise_{ast}$ on the outcome indicated in panel headings, and for the indicated subgroup, with 95% confidence intervals derived from permutation.

Table 4. Falsification test: Estimated effects of tuition-free community college at age 22 on postsecondary outcomes

	(1)	(2)	(3)	(4)	(5)	(6)
Age	23-24	24-25	25-26	26-27	27-28	28-29
			Postsecondary enrollment			
$Promise_{ast}$	-0.018	-0.008	-0.001	-0.014	-4.1e-05	0.028
	(0.004)	(0.005)	(0.004)	(0.005)	(0.006)	(0.008)
Control mean	0.275	0.224	0.191	0.168	0.149	0.134
Permutation p	0.184	0.586	0.974	0.424	0.984	0.422
			Some college, no degree (exact)			
$Promise_{ast}$	0.010	0.015	-0.004	-0.020	-0.014	0.078
	(0.004)	(0.004)	(0.005)	(0.005)	(0.007)	(0.011)
Control mean	0.314	0.288	0.275	0.267	0.262	0.258
Permutation p	0.524	0.340	0.808	0.392	0.642	0.150
			Some college, no degree (at least)			
$Promise_{ast}$	0.034**	0.030*	0.010	0.013	0.036	0.103*
	(0.005)	(0.004)	(0.004)	(0.004)	(0.007)	(0.013)
Control mean	0.685	0.692	0.698	0.703	0.706	0.710
Permutation p	0.0220	0.0560	0.572	0.522	0.230	0.0580
			Associate's degree attainment (exact)			
$Promise_{ast}$	0.003	0.007	0.002	0.004	0.007	0.007
	(0.003)	(0.002)	(0.003)	(0.003)	(0.005)	(0.009)
Control mean	0.0874	0.0908	0.0943	0.0963	0.0973	0.0991
Permutation p	0.670	0.468	0.806	0.774	0.666	0.800
			Associate's degree attainment (at least)			
$Promise_{ast}$	0.025*	0.015	0.015	0.032	0.050	0.026
	(0.005)	(0.004)	(0.005)	(0.005)	(0.009)	(0.010)
Control mean	0.372	0.404	0.423	0.436	0.444	0.452
Permutation p	0.0780	0.326	0.410	0.170	0.164	0.676
			Bachelor's degree attainment (exact)			
$Promise_{ast}$	0.015	0.012	0.025	0.042*	0.046	0.018
	(0.005)	(0.004)	(0.005)	(0.005)	(0.009)	(0.014)
Control mean	0.262	0.273	0.271	0.265	0.260	0.254
Permutation p	0.264	0.408	0.154	0.0680	0.126	0.708
			Bachelor's degree attainment (at least)			
$Promise_{ast}$	0.021	0.008	0.012	0.029	0.043	0.019
	(0.005)	(0.005)	(0.005)	(0.005)	(0.010)	(0.016)
Control mean	0.284	0.313	0.329	0.339	0.347	0.353
Permutation p	0.116	0.600	0.516	0.194	0.178	0.690

Authors' calculations using Equation 2 applied to the ACS. Clustered standard errors are in parentheses. N = 2,142 state-age-years. Statistical significance from permutation: *0.10 **0.05 ***0.01.

Table 5. Falsification test: Estimated effects of tuition-free community college at age 22 on work and family outcomes

	(1)	(2)	(3)	(4)	(5)	(6)
Age	23-24	24-25	25-26	26-27	27-28	28-29
			Labor force participation			
$Promise_{ast}$	0.002	0.001	0.002	-0.023	-0.015	-0.008
	(0.003)	(0.003)	(0.003)	(0.004)	(0.006)	(0.006)
Control mean	0.836	0.847	0.852	0.854	0.855	0.853
Permutation p	0.894	0.936	0.946	0.174	0.454	0.760
			Log occupation score			
$Promise_{ast}$	-0.001	0.005	0.006	0.003	0.018	0.036
	(0.006)	(0.007)	(0.008)	(0.007)	(0.012)	(0.016)
Control mean	10.50	10.57	10.63	10.67	10.70	10.73
Permutation p	0.990	0.910	0.808	0.930	0.676	0.570
			Log individual income from wages and salary			
$Promise_{ast}$	0.045	0.032	0.021	0.026	0.100	0.111
	(0.008)	(0.010)	(0.010)	(0.016)	(0.017)	(0.025)
Control mean	10.12	10.29	10.42	10.49	10.55	10.60
Permutation p	0.150	0.322	0.488	0.566	0.110	0.256
			Log total individual income			
$Promise_{ast}$	0.044	0.040	0.022	0.033	0.127**	0.140
	(0.009)	(0.009)	(0.009)	(0.015)	(0.018)	(0.025)
Control mean	10.18	10.35	10.49	10.56	10.62	10.68
Permutation p	0.164	0.218	0.480	0.426	0.0300	0.158
			Married			
$Promise_{ast}$	0.003	0.015	0.006	0.019	0.050	0.025
	(0.004)	(0.005)	(0.005)	(0.006)	(0.006)	(0.015)
Control mean	0.186	0.236	0.289	0.341	0.389	0.434
Permutation p	0.770	0.350	0.726	0.424	0.120	0.606
			Has a child in the household			
$Promise_{ast}$	0.006	0.001	-0.011	-0.008	-0.003	-0.010
	(0.004)	(0.005)	(0.005)	(0.006)	(0.008)	(0.017)
Control mean	0.186	0.227	0.271	0.318	0.366	0.414
Permutation p	0.642	0.916	0.522	0.696	0.990	0.860

Authors' calculations using Equation 2 applied to the ACS. Clustered standard errors are in parentheses. N = 2,142 state-age-years. Statistical significance from permutation: *0.10 **0.05 ***0.01.

References

Andrews, R. J., DesJardins, S., and Ranchhod, V. (2010). The effects of the Kalamazoo Promise on college choice. *Economics of Education Review*, 29(5):722–737.

Arkhangelsky, D., Athey, S., Hirshberg, D. A., Imbens, G. W., and Wager, S. (2021). Synthetic difference-in-differences. *American Economic Review*, 111(12):4088–4118.

Bartik, T. J. (2014). The Kalamazoo Promise scholarship: College funds boost grades of African American students. *Education Next*, 14(2):72–79.

Bartik, T. J., Hershbein, B., and Lachowska, M. (2021). The Effects of the Kalamazoo Promise Scholarship on College Enrollment and Completion. *The Journal of Human Resources*, 56(1):269–310.

Bartik, T. J. and Miller-Adams, M. (2026). Investing in Tuition-Free College Can Be a Good Economic Bet for Michigan. *Bridge Michigan*. Guest Commentary.

Bell, E. (2021a). Does free community college improve student outcomes? Evidence from a regression discontinuity design. *Educational Evaluation and Policy Analysis*, 43(2):329–350.

Bell, E. (2021b). Estimating the spillover effects of the Tennessee promise: Exploring changes in tuition, fees, and enrollment. *Journal of Student Financial Aid*, 50(1). Article 4.

Bell, E. and Gandara, D. (2021). Can free community college close racial disparities in postsecondary attainment? How Tulsa Achieves affects racially minoritized student outcomes. *American Educational Research Journal*, 58(6):1142–1177.

Bifulco, R., Rubenstein, R., and Sohn, H. (2019). Evaluating the effects of universal place-based scholarships on student outcomes: the Buffalo "Say Yes to Education" Program. *Journal of Policy Analysis and Management*, 38(4):918–943.

Bloem, M. D. and Villero, J. (2024). College Opportunity and Teen Fertility: Evidence from *Ser Pilo Paga* in Colombia. *Journal of Development Economics*, 171:103321.

Brown, C. (2023). Why counting degrees matters. *Lumina Foundation*. https://www.luminafoundation.org/news-and-views/why-counting-degrees-matters/.

Brown, M., Carruthers, C. K., Kofoed, M. S., Kramer, J. W., and Phipps, A. (2025). Does Free Community College Change Who Enlists in the Military? Qualitative and Quantitative Evidence from Tennessee Promise. Working Paper.

Bruce, D. J. and Carruthers, C. K. (2014). Jackpot? The impact of lottery scholarships on enrollment in Tennessee. *Journal of Urban Economics*, 81:30–44.

Burland, E., Dynarski, S., Michelmore, K., Owen, S., and Raghuraman, S. (2023). The power of certainty: Experimental evidence on the effective design of free tuition programs. *American Economic Review: Insights*, 5(3):293–310.

Campaign for Free College Tuition (2022). Making Public Colleges Tuition-Free. https://www.freecollegenow.org/.

Carruthers, C. (2023). The Value of a College Education in Tennessee. https://haslam.utk.edu/wp-content/uploads/2023/08/Carruthers-TN-Value-of-College-2023-08-08.pdf.

Carruthers, C. K., Bruce, D. J., Kessler, L. M., and Endersby, L. (2023). Tennessee's Post-Pandemic Workforce: Implications for the Value of Going to College. https://haslam.utk.edu/publication/tennessees-post-pandemic-workforce-implications-for-the-value-of-going-to-college/.

Carruthers, C. K. and Fox, W. F. (2016). Aid for all: College coaching, financial aid, and post-secondary persistence in Tennessee. *Economics of Education Review*, 51:97–112.

Carruthers, C. K., Fox, W. F., and Jepsen, C. (2025). What Knox achieved: Estimated effects of tuition-free community college on attainment and earnings. *Journal of Human Resources*, 60(6):2071–2104.

Carruthers, C. K. and Pratt, E. (2024). College Coaching and Completion Grants in Tennessee: Estimated Effects on Persistence. Working Paper. https://haslam.utk.edu/publication/college-coaching-and-completion-grants-in-tennessee-estimated-effects-on-persistence/.

Conley, T. G. and Taber, C. R. (2011). Inference with "difference in differences" with a small number of policy changes. *The Review of Economics and Statistics*, 93(1):113–125.

Cornwell, C., Mustard, D. B., and Sridhar, D. J. (2006). The enrollment effects of merit-based financial aid: Evidence from Georgia's HOPE program. *Journal of Labor Economics*, 24(4):761–786.

Daugherty, L. and Gonzalez, G. (2016). The impact of the New Haven promise program on college enrollment, choice, and persistence. RAND Corporation Working Paper, WR-1147-UIER.

De Chaisemartin, C. and d'Haultfoeuille, X. (2020). Two-way fixed effects estimators with heterogeneous treatment effects. *American Economic Review*, 110(9):2964–2996.

Deming, D. and Dynarski, S. (2010). College aid. In *Targeting investments in children: Fighting poverty when resources are limited*, pages 283–302. University of Chicago Press.

Denning, J. T., Marx, B. M., and Turner, L. J. (2019). Propelled: The effects of grants on graduation, earnings, and welfare. *American Economic Journal: Applied Economics*, 11(3):193–224.

Dickason, C. N., Heinrich, C., and Smith, M. (2023). Delivering on the promise: The role of supplemental promise programs in reducing barriers to college success. *The Journal of Higher Education*, 95(1):92–119.

Duflo, E., Dupas, P., Spelke, E., and Walsh, M. (2025). Intergenerational Impacts of Secondary Education: Experimental Evidence from Ghana. *American Economic Review*, forthcoming (conditionally accepted).

Dynarski, S., Page, L., and Scott-Clayton, J. (2023). College costs, financial aid, and student decisions. In *Handbook of the Economics of Education*, volume 7, pages 227–285. Elsevier.

Eng, A. and Matsudaira, J. (2021). Pell grants and student success: Evidence from the universe of federal aid recipients. *Journal of Labor Economics*, 39(S2):S413–S454.

Ferman, B. and Pinto, C. (2019). Inference in differences-in-differences with few treated groups and heteroskedasticity. *Review of Economics and Statistics*, 101(3):452–467.

Fitzpatrick, M. D. and Jones, D. (2016). Post-baccalaureate migration and merit-based scholarships. *Economics of Education Review*, 54:155–172.

Gandara, D. and Li, A. (2020). Promise for whom? "Free-College" programs and enrollment by race and gender classifications at public 2-year colleges. *Educational Evaluation and Policy Analysis*, 42(4):603–627.

Goldhaber, D., Long, M. C., Gratz, T., and Rooklyn, J. (2020). Pledging to do "good": An early commitment pledge program, college scholarships, and high school outcomes in Washington State. *Educational Evaluation and Policy Analysis*, 42(1):110–133.

Goodman-Bacon, A. (2021). Difference-in-differences with variation in treatment timing. *Journal of Econometrics*, 225(2):254–277.

Gurantz, O. (2020). What does free community college buy? Early impacts from the Oregon Promise. *Journal of Policy Analysis and Management*, 39(1):11–35.

Harris, D. N., Farmer-Hinton, R., Kim, D., Diamond, J. B., Reavis, T. B., Rifelj, K. K., Lustick, H., and Carl, B. R. (2023). The Promise of Free College (and its potential pitfalls). *Brookings Institution*. https://www.brookings.edu/articles/the-promise-of-free-college-and-its-potential-pitfalls/.

Harris, D. N. and Mills, J. (2025). Should College be "Free?" Evidence on Free College, Early Commitment, and Merit Aid from an Eight-Year Randomized Trial. *American Economic Journal: Economic Policy*, 17(3):373–406.

Heller, B. H., Kroeger, S., and Lawlor, C. M. (2025). The Effect of a Promise Scholarship: Evaluating Indiana's 21st Century Scholars Program. Working Paper. Available at SSRN 5745148.

Hendren, N. and Sprung-Keyser, B. (2020). A unified welfare analysis of government policies. *The Quarterly Journal of Economics*, 135(3):1209–1318.

Hershbein, B., McMullen, I., Pittelko, B., and Timmeney, B. (2021). Beyond degrees: Longer term outcomes of the Kalamazoo Promise. *Upjohn Institute Working Paper ; 21-350*.

Hodara, M. and Childress, L. (2021). What were the reach and impact of the Oregon Promise financial aid program in its first two years? Regional Educational Laboratory, No. 2022-119, Institute of Education Sciences US Department of Education.

House, E. and Dell, M. (2020). Keeping the promise: Early outcomes of Tennessee's tuition-free college initiative. In Perna, L. and Smith, E., editors, *Improving Research-Based Knowledge of College Promise Programs*, pages 151–172. American Educational Research Association.

Hyder, Z. J. (2024). A staggered difference-in-difference analysis of the effect of free college program adoption on sub-baccalaurate college completions. University of Tennessee PhD Dissertation.

IPUMS (2024). ACS and COVID-19: Guidance for Using the PUMS with Experimental Weights. https://usa.ipums.org/usa/acspumscovid19.shtml.

Leaser, L. and Strange, K. (2025). Higher education finance: Expenditures and costs. In Harris, D., editor, *Live Handbook of Education Policy Research*. Association for Education Finance and Policy.

MacKinnon, J. G., Nielsen, M. Ø., and Webb, M. D. (2023). Cluster-robust inference: A guide to empirical practice. *Journal of Econometrics*, 232(2):272–299.

Meyer, K., Perera, R. M., and Hansen, M. (2024). Brown Center Scholars React to President Biden's FY 2025 Department of Education Budget Proposal. *Brookings Institution*. https://www.brookings.edu/articles/brown-center-scholars-react-to-president-bidens-fy-2025-department-of-education-budget-proposal/.

Miller-Adams, M. and Iriti, J., editors (2022). *The Free College Handbook: A Practitioner's Guide to Promise Research*. W.E. Upjohn Institute for Employment Research.

Minaya, V. and Scott-Clayton, J. (2018). Labor market outcomes and postsecondary accountability: Are imperfect metrics better than none? In Hoxby, C. M. and Stange, K., editors, *Productivity in Higher Education*, pages 67–104.

Monaghan, D. B. (2025). How powerful are promises? A comprehensive review of the causal mechanisms and outcomes of 'free college'programs in the United States. *Policy Reviews in Higher Education*, 9(1):47–80.

Monaghan, D. B. and Hawke, E. A. (2024). Some promises are worth more than others: How "Free Community College" programs impact postsecondary participation, destinations, and degree completion. Annenberg Institute for School Reform at Brown University Working Paper.

Mountjoy, J. (2022). Community colleges and upward mobility. *American Economic Review*, 112(8):2580–2630.

Mountjoy, J. (2024). Marginal returns to public universities. Working Paper 32296, National Bureau of Economic Research.

National Review Editors (2015). Community college plan doomed to fail. *National Review*. https://www.nationalreview.com/2015/01/community-college-plan-doomed-fail-editors/.

National Student Clearinghouse (2022). Current term enrollment estimates. https://nscresearchcenter.org/current-term-enrollment-estimates/.

Nguyen, H. (2020). Free college? Assessing enrollment responses to the Tennessee Promise program. *Labour Economics*, 66:101882.

Nguyen, T. D., Kramer, J. W., and Evans, B. J. (2019). The effects of grant aid on student persistence and degree attainment: A systematic review and meta-analysis of the causal evidence. *Review of Educational Research*, 89(6):831–874.

Odle, T. K., Lee, J. C., and Gentile, S. P. (2021). Do promise programs reduce student loans? Evidence from Tennessee promise. *The Journal of Higher Education*, 92(6):847–876.

Page, L. C., Iriti, J. E., Lowry, D. J., and Anthony, A. M. (2019). The promise of place-based investment in postsecondary access and success: Investigating the impact of the Pittsburgh Promise. *Education Finance and Policy*, 14(4):572–600.

Page, L. C. and Scott-Clayton, J. (2016). Improving college access in the United States: Barriers and policy responses. *Economics of Education Review*, 51:4–22.

Quinton, S. (2019). Free college is increasingly popular and complicated for states. *Stateline*. https://stateline.org/2019/03/05/free-college-is-increasingly-popular-and-complicated-for-states/.

Rouse, C. E. (1995). Democratization or Diversion? The Effect of Community Colleges on Educational Attainment. *Journal of Business & Economic Statistics*, 13(2):217–224.

Ruggles, S., Flood, S., Sobek, M., Backman, D., Cooper, G., Drew, J. A. R., Richards, S., Rodgers, R., Schroeder, J., , and Williams, K. C. (2025). IPUMS USA: Version 16.0 [dataset].

Ruiz, R., Leigh, E. W., Napier, A., and Gonzalez, M. S. (2020). Community college promise programs and local impact: Aggregate effects of college attainment in three promise communities. In Perna, L. and Smith, E., editors, *Improving Research-Based Knowledge of College Promise Programs*, pages 241–266. American Educational Research Association.

Schudde, L. and Jabbar, H. (2024). *Discredited: Power, Privilege, and Community College Transfer*. Harvard Education Press.

Scott-Clayton, J. (2015). The shapeless river: Does a lack of structure inhibit students' progress at community colleges? In *Decision Making for Student Success*, pages 102–123. Routledge.

Scott-Clayton, J., Libassi, C., and Sparks, D. (2022). The fine print on free college: Who benefits from New York's Excelsior scholarship? The Urban Institute An Essay for the Learning Curve.

Semuels, A. (2015). Free Tuition Is Not Enough. *The Atlantic*. https://www.theatlantic.com/business/archive/2015/10/free-tuition/410626/.

Smith, A. (2017). Replicating Tennessee's Approach to Free Community College Takes Money and More. *Inside Higher Ed*. https://www.insidehighered.com/news/2017/03/02/replicating-tennessees-approach-free-community-college-takes-money-and-more.

Startz, D. (2021). Free community college: Progress is being made, but pitfalls remain. *Brookings Institution*. https://www.brookings.edu/articles/free-community-college-progress-is-being-made-but-pitfalls-remain/.

State Higher Education Executive Officers Association (2025). State higher education finance: Fy 2024.

Swanson, E. and Ritter, G. (2020). Start to finish: Examining the impact of the El Dorado promise program on postsecondary outcomes. *Journal of Student Financial Aid*, 49(3).

Tennessee Board of Regents (2015). President Obama Visits Pellissippi State. https://www.tbr.edu/news/president-obama-visits-pellissippi-state-2015-01-09.

Tennessee Higher Education Commission (2017–2024b). TN Promise Annual Report. https://digitaltennessee.tnsos.gov/hec_promise_reports/.

Tennessee Higher Education Commission (2024a). Tennessee college going and the class of 2023. Tennessee Higher Education Commission and Tennessee Student Assistance Corporation.

Tennessee Office of the Governor (2016). Haslam Announces Record Number of Tennessee Promise Applicants, Calls for Mentors. https://www.tn.gov/former-governor-haslam/news/2016/11/2/haslam-announces-record-number-of-tennessee-promise-applicants-calls-for-me.html.

Vanderbilt University (2014). Vanderbilt poll: May 2014. https://news.vanderbilt.edu/2014/05/21/vanderbilt-poll-may2014/.

Webber, D. (2024). Is College Worth It? Going Beyond Averages. Third Way. https://www.thirdway.org/report/is-college-worth-it-going-beyond-averages.

Appendix

A.1 Robustness and Alternate Specifications: Institution-Level Outcomes

In Section 4 of the main paper, we estimated the effect of Promise on institution-level outcomes–graduation rates, certificate and degree production, and transfer volumes–using the following specification:

$$y_{is,t+q} = Promise_{st}\beta + \gamma_i + \gamma_t + \varepsilon_{ist}, \tag{A1}$$

Main results included colleges and universities from throughout the U.S., no controls other than institution and year fixed effects, and outcomes spanning 2000-2023. Figures A1 and A2 illustrate findings from variations on this model for two-year and four-year samples, respectively. Main results reported in Section 4 are found at the top of each figure. Alternate specifications are as follows, in descending order:

- Restrict the sample to exclude states that have their own statewide free-college programs, as recorded by Campaign for Free College Tuition (2022).
- Add X_{st} controls to Equation A1, including state-year averages of age 25-65 demographic and economic characteristics derived from the ACS: unemployment rate, out-of-labor-force rate, percent white, percent Hispanic, percent who moved to the state within the last year, and median income.
- Excluding 2020 IPEDS data.

Core takeaways from our IPEDS analysis are largely stable across these four specifications. For two-year institutions, all four models detect a negative effect on graduation

rates, large and significant effects on transfers, and a positive effect on associate's degree conferral, although associate's degree estimates are imprecise in the smaller sample that excludes other Promise states. That model, however, indicates that Promise did not decrease certificate conferral, whereas the main specification indicates a large, albeit insignificant, decrease. This may indicate that our main result reflects increased certificate conferral in other Promise states.

For four-year institutions, the four alternate versions of Equation A1 collectively suggest that Promise increased the number of transfer-in students, with small and unclear effects on bachelor's degrees and graduation rates.

Our preferred approach to evaluating the Promise model is to estimate the effect of its expansion from one county in 2009 to the state in 2015. Carruthers and Fox (2016) and Carruthers et al. (2025) show that the one-county phase affected some of the outcomes we study, and Figure 1 suggests that college going trends followed the program's expansion path. As such, the $Promise_{st}$ defined in our main regression models is a continuous measure equal to the share of Tennessee high school graduates living in Promise-active counties (with both the numerator and denominator fixed at 2015 student counts). Nonetheless, there may be interest in the effect of going from 0-100% coverage, if a statewide program would be a more relevant policy tool than expanding existing programs.

Circumstances do not allow us to estimate the true effect of all-at-once, statewide Promise, since that was not the reality in Tennessee. But we can compare the statewide and pre-program phases to gain a sense of the importance of the final, statewide push relative to intermediate expansions. To do so, we adopt a binary measure of $Promise_{st}$ in an adapted version of Equation 1. Rather than introduce measurement error by coding the expansion years as having $Promise_{st} = 0$, we omit 2012-2014 from the analysis. In the interest of sample size, however, we keep 2009-2011 cohorts and consider $Promise_{st} = 0$ in those years despite roughly 5% of Tennessee 12th graders having eligibility through Knox

Achieves.

In addition to regressions following Equation 1, we evaluate the effect of binary $Promise_{st}$ using synthetic differences-in-differences (SDID), following Arkhangelsky et al. (2021). The major methodological advantage of SDID is its data-driven characterization of the counterfactual, which is constructed as a weighted average of untreated institutions that collectively followed a similar pre-2015 trend as Tennessee. We include state-year controls for unemployment, overall college attainment, percent white, and median income, to improve the match between Tennessee and synthetic counterfactuals. The major disadvantage of SDID in this context is sample coverage. Implementing SDID requires a balanced panel, which substantially reduces the IPEDS sample, as many institutions do not report all outcomes in all years. A more technical disadvantage with SDID is that results can be less precise, from estimation error in matching as well as treatment effects. As we will see for college-level and institution-level outcomes, SDID confidence intervals tend to be much wider than their corresponding TWFE estimates.[14]

Figure A3 illustrates our TWFE and SDID estimates of the effect of binary Promise on college-level outcomes. For two-year institutions (panel A), the two approaches point to 3-4 percentage-point *gains* in graduation rates, in contrast to consistently negative effects shown in Figure A1. This appears to be a result of balancing the panel and omitting schools that were missing graduation rate data in any year, which filters out all of Tennessee's Colleges of Applied Technology as well as 9% of two-year institutions in other states. Without these omissions, the TWFE model estimates a negative, 6.2 percentage-point effect of Promise on two-year graduation rates, equivalent to what we report in Table 1. Figure A3 results for binary TWFE and SDID also illustrate 15-16% gains in associate's degree conferral, which lines up very closely with the magnitude of estimated effects from Promise

[14] A conceptual disadvantage with SDID is that states making up synthetic Tennessee can differ from one outcome to another, since the same set of states are not likely to follow the same conditional pre-2015 trajectory for all outcomes.

expansion (Table 1). SDID estimates include large and statistically significant declines in certificates (23%), in contrast to imprecise 12-14% declines in the two linear frameworks, as well as larger estimated effects on the number of transfer-out students (39% gains under SDID, versus 24-32% in TWFE).

Panel B of Figure A3 illustrates TWFE and SDID estimates for four-year college outcomes. Estimated effects on graduation rates and bachelor's degrees are close to zero and statistically insignificant, as in Table 1 results for the effect of the $Promise_{st}$ dosage. TWFE results for transfer-in totals suggest that total Promise adoption had about the same effect as Promise expansion (7-8%). SDID results for transfer-in totals are centered quite a bit higher (15%) but with an extraordinarily large confidence interval.

If the estimated effect of binary Promise is much more muted when we exclude 2012-2014, then we would infer that our main results are driven by the expansion years more so than the statewide implementation. That does not appear to be the case in Figure A3, where point estimates are either very similar to our main results or larger (as with transfer volumes). In terms of college-level outcomes, we conclude that the effect of statewide Promise was as or more potent than the effect of smaller-scale implementations.

A.2 Robustness and Alternate Specifications: Individual-Level Outcomes

Our main analysis of individual education, labor, and household outcomes follows a similar specification as in the analysis of college level outcomes, but using adjacent cohorts from 1% samples of the American Community Survey from 2000-2024:

$$y_{ast} = Promise_{ast}\beta + Age_a\delta + \gamma_s + \gamma_t + \varepsilon_{ast}, \tag{A2}$$

Figures A4, A5, and A6 plot our main results from this model alongside several varia-

tions:

- Restrict the sample to exclude states that have their own statewide free-college programs, as recorded by Campaign for Free College Tuition (2022).
- Estimate Equation A2 for single-age samples and exclude Age_a from controls.
- Add X_{ist} controls to Equation A2, including state-year averages of age 25-65 demographic and economic characteristics derived from the ACS: unemployment rate, out-of-labor-force rate, percent white, percent Hispanic, percent who moved to the state within the last year, and median income.
- Exclude 2020 ACS samples
- Limit the sample to individuals whose birth state was the same as their assumed state of residence at age 17.

Figure A4 illustrates estimated effects of Promise on indicators of how individuals spend their time: In school, in the labor force, and at home. The broad pattern of our main findings hold across the five variations listed above. Promise increases the likelihood of postsecondary enrollment immediately after high school, has uncertain effects on labor force participation, and generally decreases the likelihood of marriage and dependent children before age 21.

Figure A5 plots estimated effects of Promise on educational attainment across six specifications of Equation A2. The narrative across specifications is similar: Promise increases the likelihood of "some college" attainment without a degree for a short time and has a more lasting, positive effect on associate's-level attainment or higher.

Likewise, Figure A6 results for occupation score, wage/salary income, and total income are similar across alternate specifications. Results generally suggest that Promise had no

effect on job quality in terms of potential earnings (panel A), and imprecisely positive effects on income over ages 20-24.

Table A1 reports Equation A2 results under our main specification for additional outcomes of interest. First, we consider the effect of Promise on high school graduation. Main results are derived from samples of high school graduates, which would be endogenous if tuition-free community college led more students to complete high school, or to complete high school on time. The empirical evidence for this is not strong, however: Estimated effects on high school graduation are small and statistically insignificant. The same is true for an alternate construction of occupation score, defined in Table A1 as log median income among age 18-25 workers who have the same occupation. Our main results define occupation score as median income among same-job workers of all ages. We find no effect of Promise on either measure of job quality. We also find no effect of Promise on total family income, in contrast to weakly positive effects on individual wage, salary, and total income. Total family income would include earnings from spouses and/or parents.

Figure A7 unpacks estimated effects on individual wage and salary income, plotting Equation A2 estimates of the likelihood of falling in a particular income quartile. Quartiles are defined for each age cohort in the nationwide sample. Annual wage and salary income in the first quartile is $1,000 for 24-year-olds, on average (ranging from $0-6,000) and individuals in the top/fourth quartile typically earn $62,000. We show in Figure A7 that estimated effects of Promise on income are driven entirely by gains in the likelihood of top-quartile membership.

As in the Section A.1 analysis of college-level outcomes, we supplement our main analysis with an examination of the effect of total, 0-to-100% adoption of Promise under a binary construction of $Promise_{ast}$ and omitting cohorts who were age 17 in the 2012-2014 expansion years. For the TWFE analysis of binary Promise, we estimate a modified version of Equation A2 for pooled samples of two or more age a cohorts:

$$y_{ast} = Promise_{ast}\beta + \gamma_s + \gamma_{at} + \varepsilon_{ast}, \tag{A3}$$

We focus on ages 18-19 for any postsecondary enrollment, 18-24 for some college without a degree, 20-22 for associate's outcomes, 22-24 for bachelor's outcomes, 18-20 for marriage and children, and 22-24 for labor market outcomes. These are the age ranges where we might expect to see an effect of Promise on each outcome, based on typical time to degree.

Figure A8 illustrates Equation A3 estimates with black circles. Confidence intervals are derived from 1,000 placebo permutations. Gray diamonds represent SDID estimates of treatment effects for the same samples, with confidence intervals from 1,000 placebo permutations. As in the Section A.1 SDID analysis of college-level outcomes, we include state-by-year socioeconomic controls for improved precision, although SDID confidence intervals are nonetheless quite wide.

Looking across Figure A8 results, we find that TWFE estimates of the effect of 0-to-100% Promise are generally very similar to our main results for the effect of a continuous Promise dosage. Eligibility at age 17 significantly increases the likelihood of postsecondary enrollment at 18-19, decreases the likelihood of marriage or children before 21, increases associate degree attainment, imprecisely increases bachelor's degree attainment, and increases early-20s wage and salary income. SDID estimates generally align with these patterns directionally, but they tend to be more conservative (closer to zero) and much less precisely estimated. This is most apparent with results for marriage and children, where SDID detects no change.

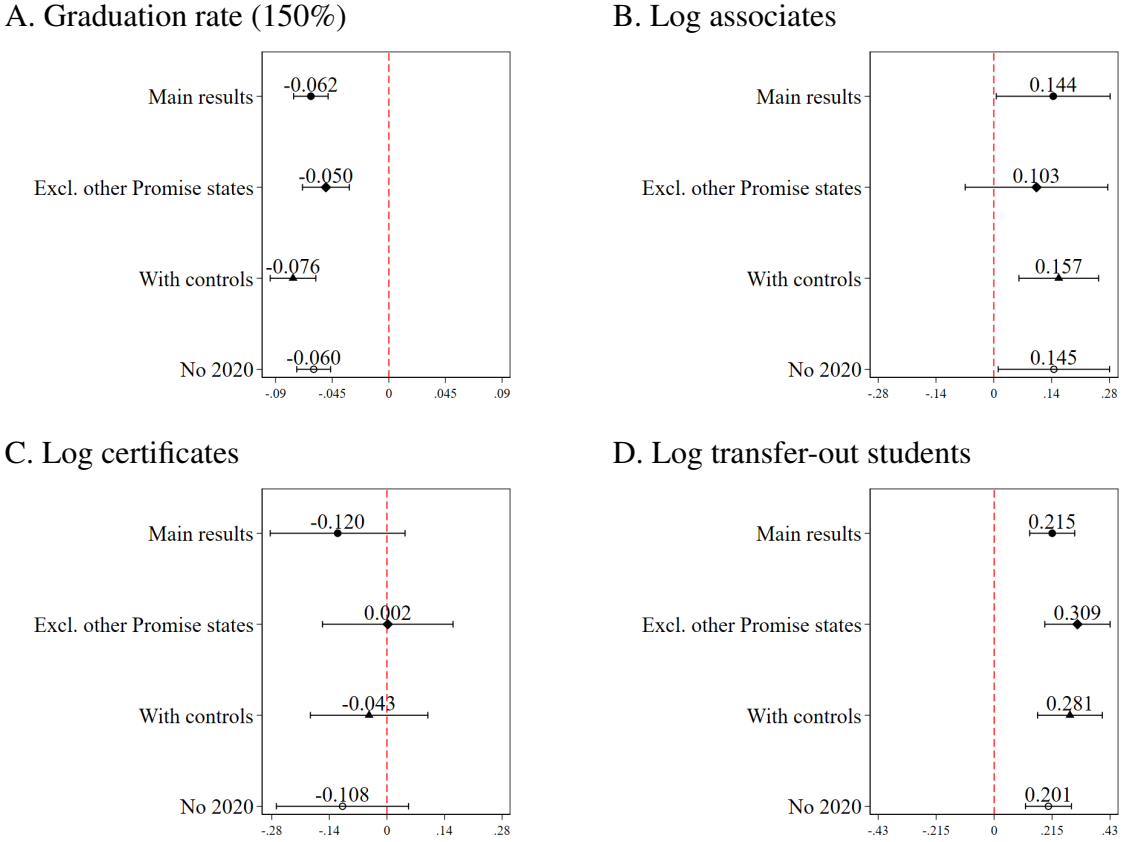
Looking across Figure A8, along with our main results for individual outcomes, we draw two conclusions about the effects of intermediate versus statewide phases of Promise. First, estimated effects of statewide Promise on college going are smaller than they were in

our main analysis of pilot, expansion, and statewide phases (2-3 percentage points versus 5.4). Although confidence intervals overlap for the two results, this is somewhat surprising given the steep, sudden growth in college enrollment in 2015, shown in Figure 1 of the main paper. Our ACS samples include cohorts from after that time, however, whose college going rates tapered down over the late 2010s before falling sharply in 2020 (Tennessee Higher Education Commission, 2024a). The scaling phase of Promise may have been more effective in getting marginal students to enroll in college than later years of the statewide phase.

Nonetheless, our second conclusion from Figure A8 is that Promise had a similar effect on post-enrollment education and workforce outcomes in the expansion and statewide years we observe. Omitting the 2012-2014 expansion period has little bearing on estimates for associate's degrees, bachelor's degrees, and early-20s income. Table 2 and 3 indicate that, when considering all phases of Promise together, age-17 eligibility increased the likelihood of age-22 associate's degree attainment by 2-3 percentage points, increased the likelihood of age-24 bachelor's degree attainment by 2-3 percentage points, and increased age-24 individual income by 6-7%. These figures line up closely with TWFE estimates for statewide Promise shown in Figure A8, the exception being statistically insignificant bachelor's degree treatment effects that are closer to 1 percentage point.[15]

[15]Dropping three cohorts may be detrimental for estimating effects of the state wide program on bachelor's degrees by age 24, since we are then limited to three cohorts with at least six years of post-high school outcomes.

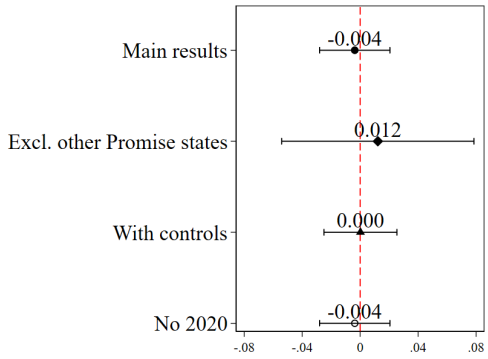
Figure A1. Two-year institution outcomes: Robustness



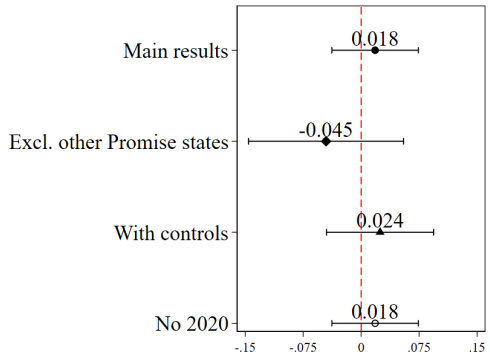
Notes: Authors' calculations using variations of Equation A1 applied to IPEDS data. In each panel, each point represents a $\hat{\beta}$ estimate for the effect of $Promise_{st}$ on the outcome indicated in panel headings, with 95% confidence intervals derived from clustered standard errors. See Section A.1 for descriptions of each variation of Equation A1, labeled at left in each figure.

Figure A2. Four-year institution outcomes: Robustness

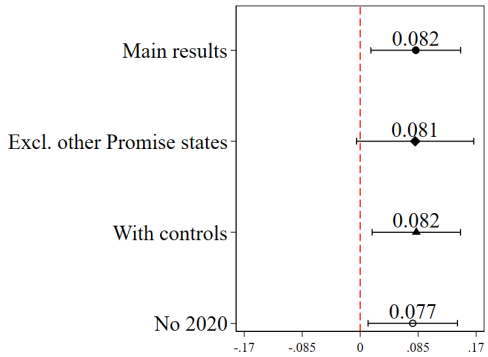
A. Graduation rate (150%)



B. Log bachelors degrees

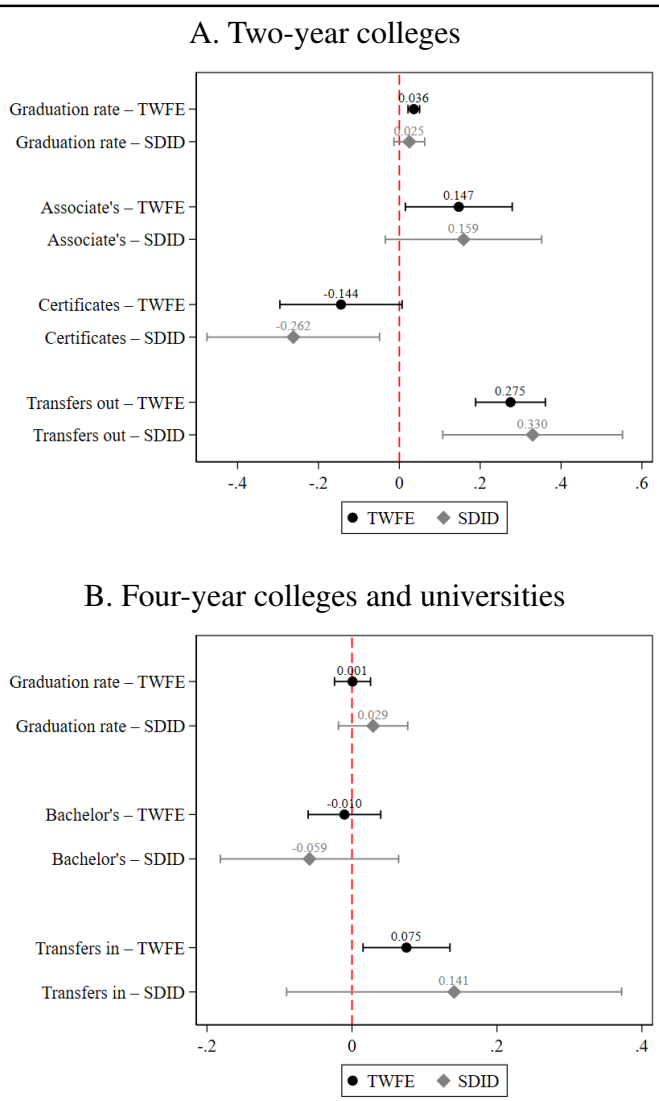


C. Log transfer-in students



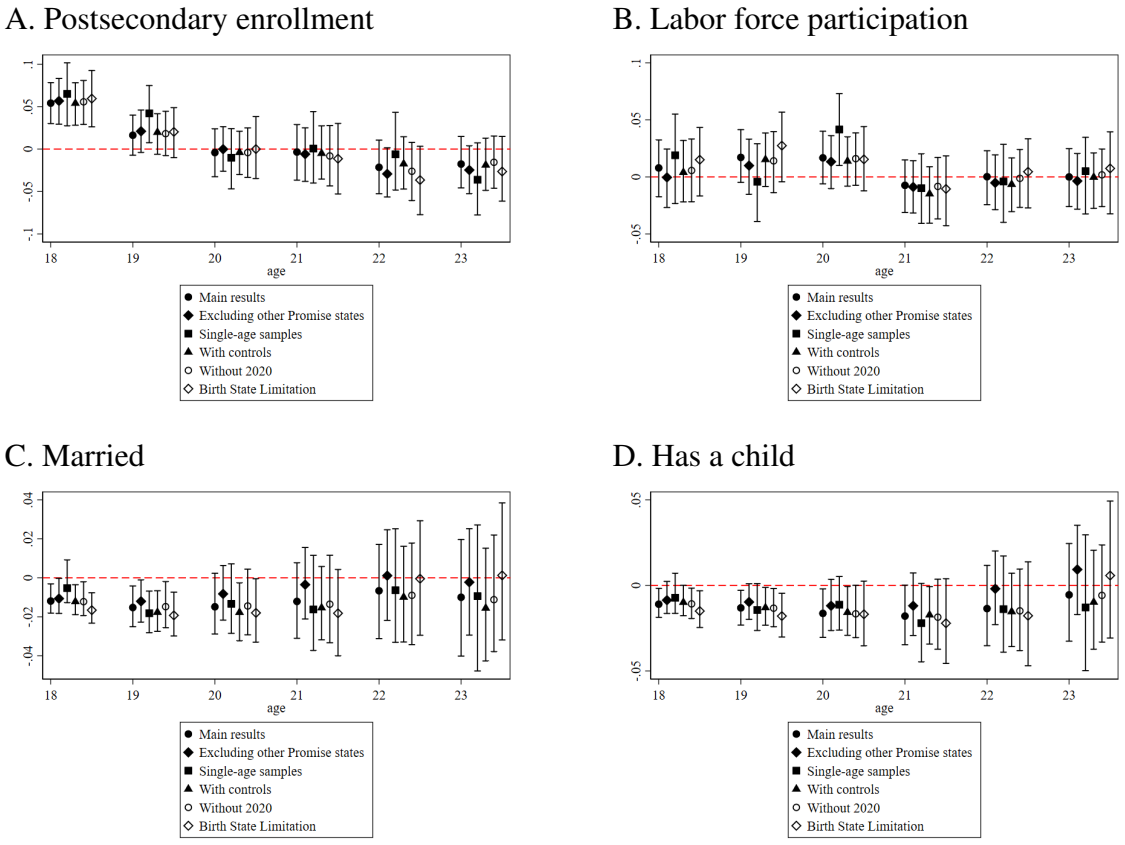
Notes: Authors' calculations using variations of Equation A1 applied to IPEDS data. In each panel, each point represents a $\hat{\beta}$ estimate for the effect of $Promise_{st}$ on the outcome indicated in panel headings, with 95% confidence intervals derived from clustered standard errors. See Section A.1 for descriptions of each variation of Equation A1, labeled at left in each figure.

Figure A3. Estimated institutional effects of binary Tennessee Promise: Two-way fixed effects and synthetic difference-in-differences



Authors' calculations using IPEDS. The figure plots TWFE estimates of Equation A1 with black circles and SDID estimates with gray diamonds, with 95% confidence intervals derived from 1,000 placebo permutations for both models. $Promise_{st}$ in both models is binary, and 2012-2014 expansion years are excluded. SDID estimates control for state-by-year measures of unemployment, college education, percent white, and median income, all derived from the ACS (all ages), using Census-provided weights.

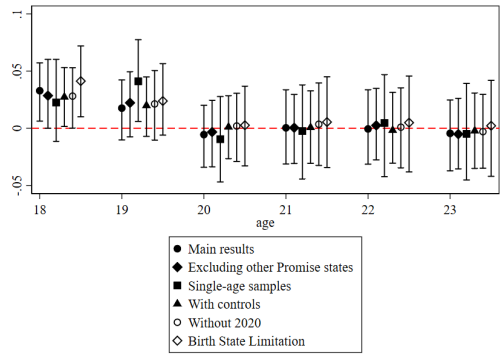
Figure A4. Individual and household status: Robustness



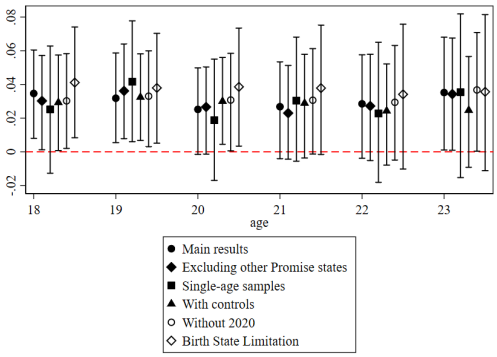
Notes: Authors' calculations using variations of Equation A2 applied to the ACS. In each panel, each point represents a $\hat{\beta}$ estimate for the effect of $Promise_{ast}$ on the outcome indicated in panel headings, with 95% confidence intervals derived from permutation. See Section A.2 for descriptions of each variation of Equation A2, labeled at left in each figure.

Figure A5. Postsecondary outcomes: Robustness

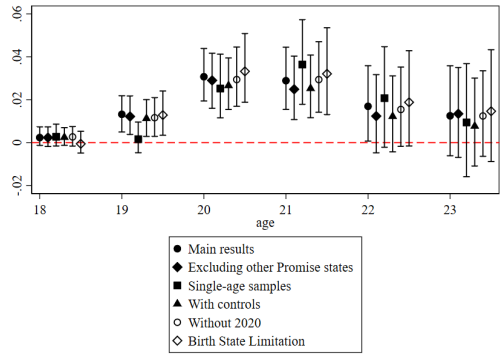
A. Some college, no degree (exact)



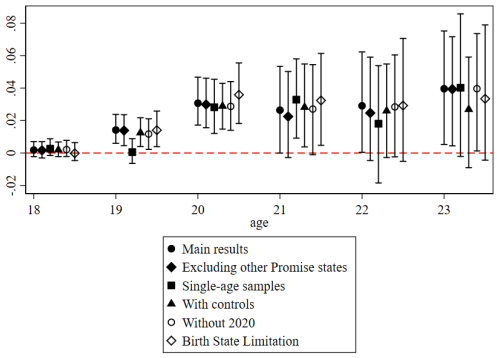
B. Some college, no degree (at least)



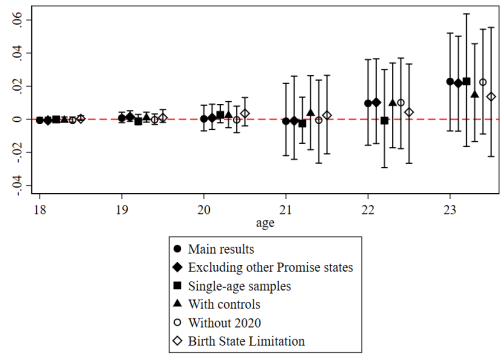
C. Associate's degree (exact)



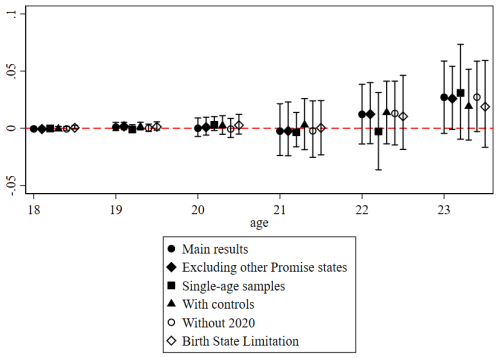
D. Associate's degree (at least)



E. Bachelor's degree (exact)



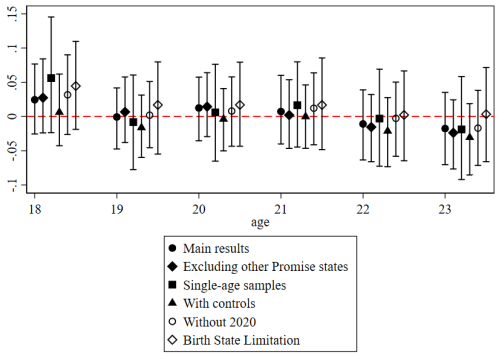
F. Bachelor's degree (at least)



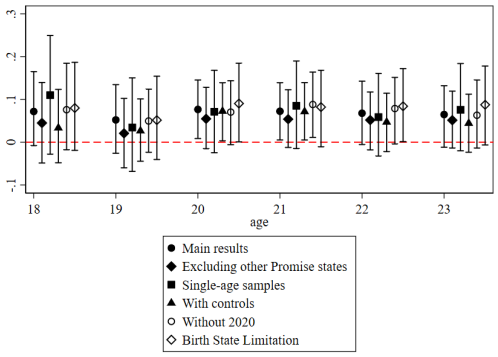
Notes: Authors' calculations using variations of Equation 2 applied to the ACS. In each panel, each point represents a $\hat{\beta}$ estimate for the effect of $Promise_{ast}$ on the outcome indicated in panel headings, with 95% confidence intervals derived from permutation. See Section A.2 for descriptions of each variation of Equation A2, labeled at left in each figure.

Figure A6. Income outcomes: Robustness

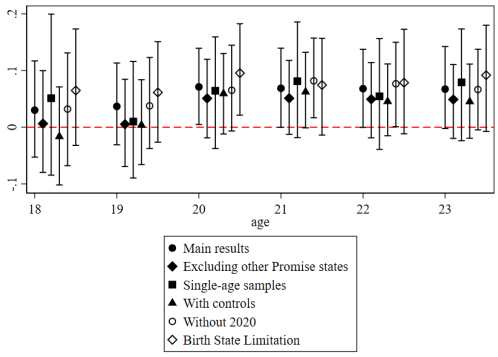
A. Log occupation score



B. Log individual wage and salary income



C. Log total individual income



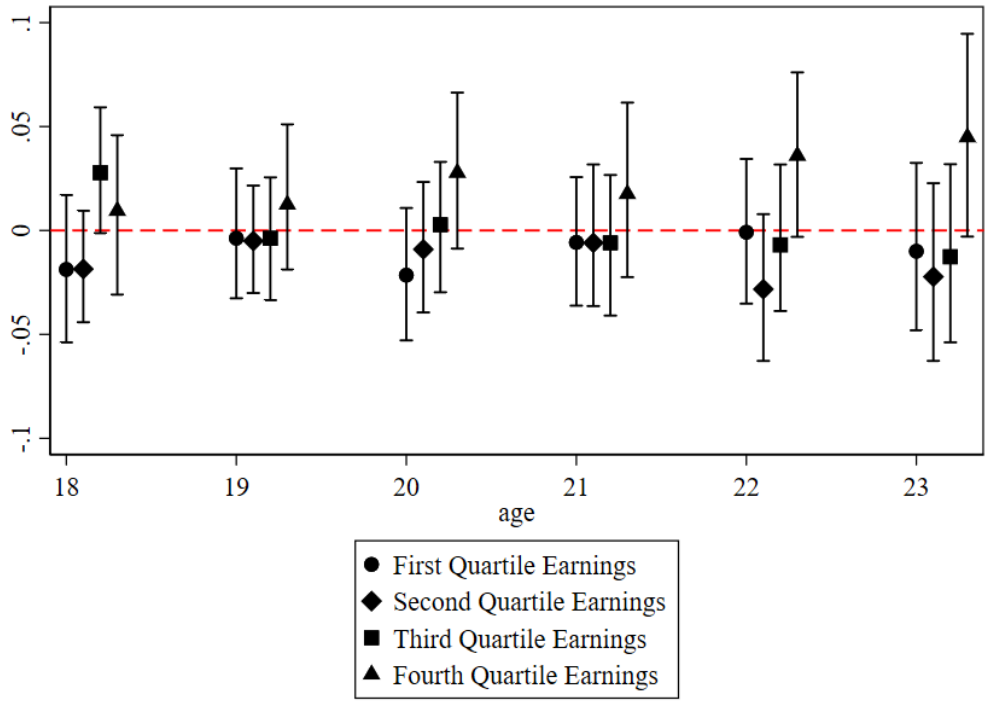
Notes: Authors' calculations using variations of Equation 2 applied to the ACS. In each panel, each point represents a $\hat{\beta}$ estimate for the effect of $Promise_{ast}$ on the outcome indicated in panel headings, with 95% confidence intervals derived from permutation. See Section A.2 for descriptions of each variation of Equation A2, labeled at left in each figure.

Table A1. Additional individual outcomes

	(1)	(2)	(3)	(4)	(5)	(6)
Age	18-19	19-20	20-21	21-22	22-23	23-24
			High school graduate			
$Promise_{ast}$	-0.008	0.011	0.014	0.013	0.009	0.008
	(0.004)	(0.004)	(0.003)	(0.004)	(0.004)	(0.003)
Control mean	0.726	0.874	0.893	0.901	0.903	0.903
Permutation p-value	0.466	0.204	0.104	0.174	0.374	0.460
			Log early-career occupation score			
$Promise_{ast}$	0.015	0.009	0.005	0.000	-0.003	-0.013
	(0.005)	(0.005)	(0.005)	(0.004)	(0.004)	(0.005)
Control mean	9.376	9.495	9.601	9.712	9.837	9.931
Permutation p-value	0.492	0.678	0.822	0.988	0.876	0.542
			Log total family income			
$Promise_{ast}$	-0.023	-0.038	-0.029	-0.011	0.002	0.011
	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)
Control mean	11.578	11.464	11.371	11.345	11.355	11.352
Permutation p-value	0.402	0.202	0.396	0.714	0.962	0.696

Authors' calculations using Equation A2 applied to the ACS. Clustered standard errors are in parentheses. N = 2,448 state-age-years. Statistical significance from permutation: *0.10 **0.05 ***0.01.

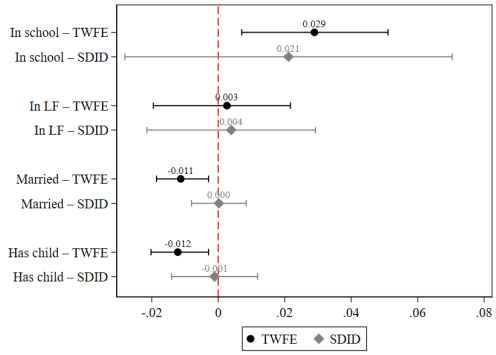
Figure A7. Additional income outcomes: Income quartiles



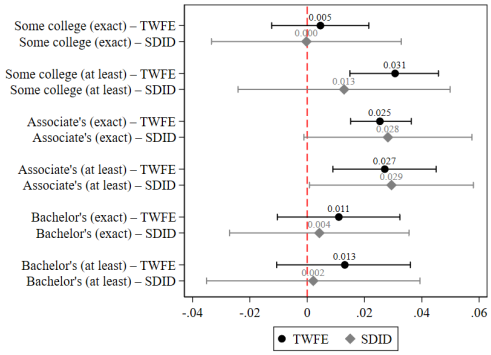
Notes: Authors' calculations using Equation A2 applied to the ACS. Clustered standard errors are in parentheses. N = 2,448 state-age-years. Statistical significance from permutation: *0.10 **0.05 ***0.01.

Figure A8. Estimated individual effects of binary Tennessee Promise: Two-way fixed effects and synthetic difference-in-differences

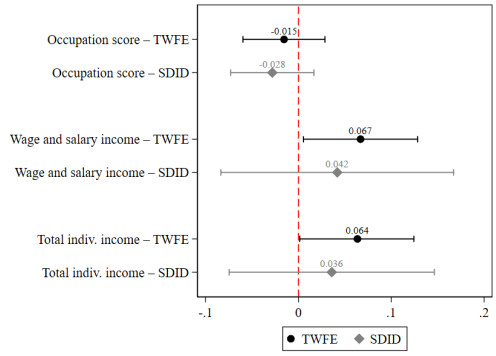
A. Individual and household status



B. Postsecondary outcomes



C. Income outcomes



Notes: Authors' calculations using the ACS. The figure plots TWFE estimates of Equation A3 with black circles and SDID estimates with gray diamonds, with 95% confidence intervals derived from 1,000 placebo permutations for both models. $Promise_{ast}$ in both models is binary, and 2012-2014 expansion years are excluded. SDID estimates control for state-by-year measures of unemployment, college education, percent white, and median income, all derived from the ACS (all ages), using Census-provided weights. Samples cover different age ranges for different outcomes: 18-19 for postsecondary enrollment, 22-24 for labor market outcomes, 18-20 for marriage and children, 18-24 for some college, 20-22 for associate's, and 22-24 for bachelor's.