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## Estimating the Spillover Effects of the Tennessee Promise: Exploring Changes in Tuition, Fees, and Enrollment

### Cover Page Footnote

I thank Deven Carlson and Jennifer Delaney for their helpful feedback on the manuscript.

# Estimating the Spillover Effects of the Tennessee Promise: Exploring Changes in Tuition, Fees, and Enrollment

By Elizabeth Bell

*Tuition-free college policies have gained momentum since the implementation of the Tennessee Promise, which provides financial aid to students pursuing two-year post-secondary degrees in Tennessee. While previous research has addressed the effects of similar programs on student outcomes, scholars have yet to thoroughly investigate potential spillover effects of Promise policies on colleges that are ineligible for Promise funds. In this paper, I leverage a difference-in-differences design to explore changes in enrollment and tuition and fees at institutions eligible and ineligible for Tennessee Promise funds. First, I find that in-state enrollment increased significantly at public Promise eligible institutions (mainly public two-year and technical colleges) and in-state enrollment decreased at public four-year colleges that are ineligible to receive Promise funds. Moreover, out-of-state enrollment increased at Promise ineligible public four-year colleges after the Promise was implemented. Second, I find that Black student enrollment declined by 1-2 percentage points at private colleges ineligible for Promise funds. Finally, public colleges eligible for Promise funds raised tuition after the Tennessee Promise was implemented. Together, these findings indicate that in the aftermath of the Tennessee Promise, there were significant changes in enrollment and tuition levels across institutions eligible and ineligible for Promise funds.*

**Keywords:** *higher education finance, tuition-free college, financial aid*

Tuition-free college policies have become a cornerstone of policymakers' efforts to expand college access, affordability, and degree attainment. To date, researchers estimate more than 300 tuition-free college initiatives have been proposed or implemented at the state and local level (College Promise, 2017; Perna & Leigh, 2018). While the tuition-free college movement has its roots in local pioneering initiatives such as the Kalamazoo Promise and the Pittsburgh Promise (Bartik et al., 2019; Page et al., 2018), statewide initiatives have also spread across the country, with 16 states currently operating Promise programs (Perna & Leigh, 2018; Mishory, 2018). Many of the state-wide Promise programs are similar to the Tennessee Promise. In fact, 9 out of the 16 state Promise programs limit Promise dollars to two-year degrees and utilize last-dollar structures in which the amount of aid students receive depends on their eligibility for other Federal and state aid programs—any tuition and fees expenses remaining after exhausting other Federal and state aid is covered by the Promise (Mishory, 2018). [1] Mounting evidence suggests that Promise programs can positively impact college enrollment, persistence, and degree completion (Bartik et al., 2019; Carruthers & Fox, 2016; Page et al., 2018; Harris et al., 2018; Swanson & Ritter, 2020), but programs that limit funds to cover two-year degrees, like the Tennessee Promise, may also divert students from four-year to two-year colleges (Gurantz, 2020; Carruthers & Fox, 2016; Nguyen, 2019). These spillover effects or unintended consequences of Promise programs are a key area for researchers given the prevalence and power of Promise programs to impact students, families, and institutions of higher education. For instance, by limiting the types of institutions that are eligible for Promise funds (hereafter, Promise eligible institutions), programs like the Tennessee Promise could create spillover effects on institutions ineligible for Promise funds (hereafter, Promise ineligible institutions).

In this analysis, I explore the changes in enrollment and tuition and fees at Promise eligible and Promise ineligible institutions. Specifically, I leverage annual institutional level data from the Integrated Postsecondary Education Dataset (IPEDS) from 2012-2016 to evaluate the extent to which Tennessee Promise eligibility impacted total first-time fall undergraduate enrollment, racial and ethnic minority enrollment, and tuition and fees at both eligible and ineligible institutions. The empirical analysis reveals significant shifts in both tuition and fees and enrollment after the implementation of the Tennessee Promise.

There are three main findings that are robust across multiple specifications and robustness checks. First, after the implementation of the Promise scholarship, public Promise eligible institutions experience large gains in in-state first-time undergraduate enrollment. Furthermore, public ineligible institutions (public four-year universities) face large declines in in-state enrollment and an increase in out-of-state enrollment. These changes suggest that ineligible public institutions (public four-year universities) shift to recruiting more out-of-state students to offset the losses to in-state enrollment and ensure adequate revenue streams. Second, public Promise eligible institutions (mainly public community & technical colleges) significantly raised tuition after the implementation of the Tennessee Promise program. This finding is significant not only in substantive impact but also in its contribution to the literature on how institutions respond when governments increase direct subsidies to students. In line with the Bennett Hypothesis, which posits that institutions will raise prices to capture additional government funds when there is an increase in direct subsidies to students, I find that institutions eligible for Promise funds significantly raised tuition in the aftermath of the Tennessee Promise implementation (Curs & Dar, 2010a; Doyle et al., 2009). Finally, I find that black student enrollment at private Promise ineligible universities dropped by approximately 1-2 percentage points after the implementation of the Promise policy, though the statistical significance of this finding was not consistent across specifications.

The paper proceeds with an in-depth description of the Tennessee Promise policy, followed by the theoretical framework. Next, I lay out the data, measures, and analytical approach. Finally, I present the findings and robustness checks and conclude with a discussion of the theoretical and practical implications of the findings.

## Policy Background

Due to declining college affordability (Deming & Dynarski, 2010; Baum & Ma, 2014), policymakers have increasingly utilized tuition-free college policies as a cornerstone of efforts to increase college access and attainment (College Promise, 2017; Perna & Leigh, 2018). This movement, commonly known as the Promise or tuition-free college movement, began at the local level in places like Kalamazoo as early as 2005 and has spread rapidly to more than 300 communities (Bartik et al., 2019; Perna & Leigh, 2018; College Promise, 2017). More recently, state leaders in 16 states have joined the Promise movement, with Tennessee leading the charge as an early adopter. The tuition-free college movement in Tennessee started at the county level with the Knox Achieves program, which provided tuition-free college and mentoring to all students in Knox County beginning in 2008 (Carruthers & Fox, 2016). By 2011-2012, the Knox Achieves program expanded to cover twenty-two counties across the state and in 2014, the Tennessee state legislature decided to expand the tuition-free college program to a state-wide universal free community college policy providing last-dollar assistance and college mentoring to students accepted into the program (Carruthers & Fox, 2016). The financial aid and the mentoring components of the program were combined to achieve the goal of increasing college access and success for Tennessee high school students (Tennessee Higher Education Commission, 2017). To be admitted to the Tennessee Promise program, students have to meet specific eligibility requirements and enroll in an eligible Promise institution.

For students starting with the graduating class of 2015, high school seniors who graduate from a Tennessee eligible high school could apply for the Promise program. To receive financial aid under the Tennessee Promise program, students must complete an application, complete the FAFSA, and qualify for in-state tuition. All students who apply for the Promise program receive a mentor, who assists with FAFSA filing and provides encouragement and advice on college options. In the Fall of 2014, almost 90 percent of high school seniors, or approximately 58,000 students applied for the program and 16,291 students enrolled in Fall 2015 (National Conference of State Legislators, 2016). [2]

Successful applicants are provided last-dollar assistance covering tuition and fees (i.e. not living and book expenses) at one of the 27 colleges of applied technology, 13 community colleges or one of the in-state private or public 4-year universities that offers an associate's degree or an equivalent technical

certificate and are deemed eligible by the Tennessee Higher Education Commission (THEC). However, the last-dollar aid cannot be used at an ineligible Promise institution. As one of the central components of the analysis, it is important to note the number of institutions in each sector that are Promise eligible and ineligible. In Table 1 below, I provide a description of the Promise eligible and ineligible Tennessee institutions by ownership and sector.

Table 1

*Number of Promise Eligible and Ineligible Tennessee Institutions, by Institution Type*

Type of Institution	Promise Eligible Institutions		Promise Ineligible Institutions	
	2015-16	2016-17	2015-16	2016-17
<i>By Ownership</i>				
Public	42	42	8	8
Private-For-Profit	2	1	86	84
Private-Non-Profit	15	18	36	32
<i>By Ownership &amp; Sector</i>				
Public 4-year	2	2	8	8
Public 2-year & Less than 2-year	40	40	0	0
Private 4-year	16	18	49	45
Private 2-year & Less than 2-year	1	1	73	71

Based on correspondence with THEC, eligibility is based solely on whether the institution offers an associate’s degree (either of arts or sciences). Originally, only public universities were going to be eligible, but based on a compromise with private universities, any institution that offers an associate’s degree was deemed eligible for the Promise. Additionally, it should be noted that while the Promise scholarship covers all tuition and fees for associate’s degrees at public universities, students wanting to attend a private university might not have all of tuition and fees covered. According to THEC, students attending private universities will only receive the amount of aid that they would have received at a public (based on the average tuition and fees of the same program at public universities in the state). This makes the potential impacts on private universities even more likely, as the incentive structure is mainly focused on increasing college attendance at public universities.

### Theoretical Framework

The goal of this study is to estimate the impact of Tennessee Promise eligibility on institutional behavior and enrollment patterns. While an extensive body of work addresses the effects of financial aid policies on student outcomes and institutional behavior (Scott-Clayton 2011; McBain 2011; Toutkoushian & Shafiq, 2009; Deming & Dynarksi, 2009; Deming & Walters, 2017), there has not been sufficient scholarly effort dedicated to investigating the behavioral responses by both institutions *and* students to tuition-free community college policies. However, there is an abundance of scholarship on institutional and individual responses to non-institutional financial aid policies more generally, which I draw upon in my analysis (Doyle et al. 2009, Long 2004; Lowry 2001; Rizzo & Ehrenberg, 2003; Curs & Dar, 2010a; Delaney & Kearney, 2016). In particular, I leverage literature on resource dependence theory, the Bennett hypothesis, and emerging Promise policy evaluations to situate this study in existing literature and lay theoretical foundations

for better understanding the impact of institutional eligibility in the context of state wide tuition-free college policies.

### Shifts in Institutional Behavior

Previous studies investigating the influence of financial-aid policies on institutional behavior use resource dependence theory (RDT) as the overarching theoretical framework. Generally, resource dependence theory predicts that an institution's external environment influences the organization's behavior in the pursuit of adequate resources (Pfeffer & Salancik, 1978; Delaney & Kearney, 2016). In particular, institutions of higher education when pressed for financial resources must implement policies that increase revenue generation so that they may continue to serve students and fulfill their institutional missions (Weisbrod et al., 2008). For public universities, this behavior may come in the form of lobbying the state government for more appropriations or for the ability to raise tuition and fees, while private institutions may raise tuition and fees or pursue other revenue generating measures. Alternatively, institutions could respond by changing recruitment priorities and attempting to increase access to resources through targeting qualified out-of-state or international students that bring in more tuition revenue (Rizzo & Ehrenberg, 2003). In the context of the Tennessee Promise, ineligible institutions might exhibit these types of risk averse behaviors as they attempt to cope with the increased competition for qualified in-state students. Indeed, due to the incentives for students to attend Promise eligible institutions and the massive take up of the program, the Promise ineligible institutions may have to significantly shift priorities in order to maintain financial solvency.

The next theoretical frame underlying this literature is the Bennett hypothesis, which builds on RDT by suggesting that institutions will raise tuition in response to increasing levels of student aid from non-institutional sources (i.e. state or federal government). In this way, institutions can “capture some of the state financial aid resources through increases in tuition” (Curs & Dar, 2010a, p. 7). However, based on the mixed findings regarding the effects of rising levels of non-institutional aid (i.e. state or federal financial aid) on tuition levels in previous studies, the Bennett hypothesis may or may not be an accurate characterization of institutional behavior. For instance, Rizzo & Ehrenberg (2003) found no significant evidence that federal or state aid policies changed in-state or out-of-state tuition at public universities. In fact, scholars found that public institutions actually lower tuition as states invest in more financial aid (Curs & Dar 2010a) and that public institutions allocate institutional aid based on state policy (Doyle et al., 2009). On the other hand, in the context of the Georgia HOPE scholarship, scholars have found that institutions with a greater proportion of HOPE recipients increase tuition and fees at higher levels than other institutions (Long, 2004). Additionally, this revenue capturing behavior has also been identified in the context of Pell grants and state need-based and merit-based financial aid, especially among private institutions (Singell & Stone, 2007; Curs & Dar 2010b). Given the mixed nature of previous findings along this line of inquiry, this study will contribute to the scholarly literature by providing another assessment of the validity of the Bennett hypothesis in the new and unique context of the Tennessee Promise. Indeed, the Tennessee Promise represents a deviation from the norm in higher education finance by providing full coverage of tuition and fees with a comparatively small number of means-tested requirements. Furthermore, as noted earlier, the number of students participating in the program is enormous. Together, both the universality and high levels of participation in the Promise program creates serious potential for Promise eligible institutions to exhibit behavior in line with the Bennett hypothesis.

Furthermore, previous studies suggest that there will likely be heterogeneity in price setting behavior based on the sector of the institution. As a result of being publicly owned and funded, public institutions face greater accountability pressure from political leaders, which translates into varying institutional behavior in the wake of expanded state financial aid resources (Delaney & Hemenway, 2017). Therefore, public institutions may be especially likely to engage in behavior that aligns with state policy priorities due to a greater reliance on state government funding. For instance, as alluded to above, studies have found that increases in Pell funding have resulted in rising tuition at private universities but have not found the same behavior at public institutions (Singell & Stone, 2007). In addition, it should be noted that the structure of

the higher education governance system also influences institutional behavior. For instance, in states with consolidated governing boards, which have more authority over higher education institutions than coordinating boards, public universities are more likely to lower net price in response to increased financial aid while private universities remain unresponsive (Curs & Dar, 2010a). In Tennessee, the state higher education governance structure is the less authoritative coordinating board, however, public institutions of higher education do not have significant tuition setting authority. In fact, any shift in tuition and fees has to be approved by the Tennessee Higher Education Commission (THEC). The process takes about six months starting with non-binding guidance from THEC in the fall which establishes the acceptable range of changes in tuition for public institutions. Then, each public institutions' board votes to approve tuition and fee increases which are subject to approval by THEC in the spring and implemented in the following year. However, according to the meeting minutes of THEC on tuition and fee setting authority, while in-state tuition and fee rates at public institutions are heavily scrutinized by the commission, private universities and public out-of-state rates are not under the jurisdiction of the commission to review and approve (Tennessee Higher Education Commission, 2017). Based on these findings, I distinguish between public and private institutions in the analysis in order to reveal potential heterogeneity.

Finally, previous studies also suggest that tuition is not the only relevant area in which to observe shifts in institutional behavior in response to non-institutional aid; scholars have uncovered significant shifts among in-state fees, out-of-state tuition and room and board in response to shifting state financial policy environments (Delaney & Kearney, 2016; Long 2004). These behaviors align with RDT in that institutions were able to secure revenue streams by raising out-of-state tuition or by manipulating less visible elements of price, while also avoiding the politically infeasible option of raising in-state tuition (Delaney & Kearney, 2016; Long 2004). Based on these findings, one might expect similar institutional behavior in response to the Tennessee Promise, which sharply increases competition for in-state students. For instance, with the potential loss in enrollment in mind, one might expect Promise ineligible institutions to raise less visible elements of price in order to make up for decreasing enrollment in a politically feasible way. However, we might also expect that ineligible institutions would decrease the marketable, publicized cost so that they seem competitive with the other institutions and recruit students that pay more in tuition and fees on average. In order to uncover these shifts in institutional price setting, this analysis includes variables that capture both in-state and out-of-state combined tuition and fees coupled with measures of required fees specifically.

### **Shifts in Enrollment Behavior**

Another area of potential impacts is enrollment behavior, which is also likely subject to change in the wake of Promise implementation. The literature on enrollment trends is dominated by studies on the effects of state and federal grant aid on college enrollment in general (Dynarski, 2000; Dynarski, 2008; Scott-Clayton, 2011; Cornwell, Mustard, & Sridhar, 2006; Sjoquist & Winters, 2012; Dynarski, 2003; Lovenheim & Owens, 2014), and for racial and ethnic minorities specifically (Gandara & Li, 2018; Jackson, 1990; John & Noell, 1989; Ches & DesJardin, 2010). Recent extensions of this work uncover the impact of Promise programs on college enrollment, retention, degree completion, and local economic development (Bartik et al., 2019; LeGower & Walsh, 2017; Gurantz, 2020; Pluhta & Penny, 2013; Miller-Adams, 2015; Page et al., 2018; Harris et al., 2018; Gandara & Li, 2018). In line with previous work on the effects of other state and federal aid policies (Dynarski, 2000; Scott-Clayton, 2011), Promise evaluations have revealed large increases in total enrollment and particularly pronounced surges in racial and ethnic minority enrollment in response to Promise policies (Bartik et al., 2015; Pluhta & Penny, 2013; Gandara & Li, 2018; Gurantz, 2020). Evaluations of the Kalamazoo Promise also reveal that the Promise significantly increased the likelihood of obtaining a credential, with particularly large effects for racial and ethnic minorities and women (Bartik et al.,

2019). In the context of the Tennessee Promise, it is likely that similar increases in enrollment will occur and may be particularly pronounced for racial and ethnic minority groups.

In addition, emerging research reveals that Promise programs like the Tennessee Promise may divert enrollment from four-year colleges to two-year colleges as a result of the limiting eligibility for Promise funds to two-year degrees (Carruthers & Fox, 2016; Delaney & Hemenway, 2017; Deming 2017; Gurantz, 2020). In their evaluation of the Knox Achieves program [3], Carruthers and Fox (2016) identify increases in enrollment at two-year colleges, but not at four-year colleges. In fact, the estimates suggested that Knox Achieves shifted enrollment away from four-year colleges and into two-year colleges. This proposition is supported by Gurantz (2020), which finds that the Oregon Promise shifted student enrollment to two-year colleges and away from four-year colleges in the first cohort after the policy was implemented. Together, these studies suggest that, in the context of the Tennessee Promise, in which aid can only be utilized at some institutions, one might expect to see heterogeneous effects of the policy on enrollment based on Promise eligibility, with increases in enrollment concentrated at eligible institutions. [4]

### Data Description

I collected the institutional level, annual data for the years 2012-2016 from the Integrated Postsecondary Education Dataset (IPEDS). For each institution, the key dependent variables of interest for cost of attendance include the following in nominal dollars: annual average tuition and fees [5], in-state tuition and fees, out-of-state tuition and fees, in-state required fees, and out-of-state required fees. The dependent variables measuring Fall enrollment include: the total number of first-time undergraduate students, the number of in-state and out-of-state first-time undergraduate students enrolled, the percentage of students that are Black, and the percentage of students that are Hispanic/Latino.

I hand coded the dichotomous treatment variables indicating whether the institution was eligible or ineligible for the Promise program based on the official list of eligible institutions in 2015 and 2016 according to the Tennessee Higher Education Commission. Interestingly, five private colleges became eligible in 2016 while three colleges that were eligible for the Promise in 2015 were no longer eligible in 2016. [6] Additionally, it should be noted that some private colleges were no longer in business in 2016, and any colleges closed during the time period of study are excluded from the analysis. The data are summarized in Table 2 below.

Table 2

*Descriptive Statistics (2012-2015)*

	Sub-Group Means									Full Data		
	Promise			Non-Promise			Comparison Group			Mean	SD	N
	All	Pre	Post	All	Pre	Post	All	Pre	Post			
<b>Outcome Variables</b>												
<i>Price (in thousands)</i>												
Tuition and Fees	10.4	10.1	10.7	16.4	16.2	16.5	14.2	14.0	14.4	15.4	9.5	328
In-State Tuition and Fees	8.9	8.8	9.2	15.9	15.8	16.1	13.2	13.1	13.4	14.6	9.9	328
Out-of-State Tuition and Fees	11.8	11.5	12.2	16.8	16.7	17.1	15.1	14.9	15.3	16.1	9.4	328
In-State Fees	0.58	0.55	0.64	0.66	0.64	0.68	0.75	0.71	0.81	0.76	1.3	201
												18

Out-of-State Fees	0.67	0.64	0.71	0.67	0.65	0.69	0.86	0.81	0.93	0.81	1.6	201 18
<i>Enrollment</i>												
Percent Black Enrollment	0.18	0.18	0.18	0.31	0.32	0.30	0.28	0.28	0.28	0.19	0.22	269 75
Percent Hispanic Enrollment	0.03	0.03	0.03	0.04	0.03	0.05	0.04	0.03	0.04	0.14	0.19	269 75
Total Enrollment	246	246	244	130	1333	123	237	239	2316	2623	5790	269 75
In-State Enrollment	536.	474.	818.	236.	214.	378.	426.	396.	601.	466.	915.	183 60
Out-of-State Enrollment	45.9	42.8	60.3	71.9	61.2	140.	108.	99.8	158.	90.3	293.	183 60

**Note:** All Cost of Attendance variables are presented in thousands for ease of interpretation.

In Table 2, I also include the means for Promise eligible and ineligible institutions as well as the comparison group of institutions for both pre- and post-implementation years. While there are not many significant descriptive changes in these means in pre- and post-implementation for all institutions, these estimates neglect heterogeneity by the sector of the institution, which will be explored in the formal analysis.

### Sample and Measures

The sample consists of all postsecondary institutions in Tennessee, including colleges eligible and ineligible for the Tennessee Promise program. In addition, I gather data on institutions in all states to provide an additional comparison group to test the robustness of the results and increase confidence in the estimates.

Furthermore, based on previous research, I include a multitude of measures for the cost of attendance to capture more nuanced variation in the institutional pricing behavior (Long, 2004). Specifically, distinguishing between in-state and out-of-state tuition and fees will capture the potential for institutions to differentially shift pricing based on the residence of the student. Finally, isolating the in-state required fees and the out-of-state required fees can illuminate whether institutions are keeping tuition stable, but manipulating fees.

Likewise, the various measures of enrollment trends capture multiple potential areas for shifts to occur. While total undergraduate enrollment is interesting, the difference between the enrollment of in-state and out-of-state students may also reveal shifting institutional priorities in recruitment. Additionally, the shifts in enrollment among racial and ethnic minorities also provides a more nuanced analysis of the types of students whose enrollment behavior is changing in the aftermath of the Tennessee Promise implementation.

### Empirical Approach

To evaluate the effects of Tennessee Promise eligibility on tuition and fees and enrollment, I utilize the introduction of the Promise program as a natural or quasi-experiment. Specifically, I employ a difference-in-differences design that compares the key outcomes of interest across institutions impacted by the Tennessee Promise and a comparison set of institutions before and after the introduction of the Promise policy (Morgan & Winship 2014; Furquim, Corral, & Hillman, 2019). As such, the specification of the comparison group is especially important for the validity of the design. For this reason, I perform the analysis on multiple comparison groups. In the results presented below, I utilize the most empirically robust and theoretically relevant comparison group, which consists of neighboring states with similar higher education

governance structures (coordinating boards). [7] Within this analysis, there are three groups of institutions: the first group is made up of institutions in Tennessee *eligible* for the Tennessee Promise funds, the second group is made up of the institutions in Tennessee *not eligible* for Tennessee Promise funds, and the final group is made up of institutions in neighboring states with similar governance structures, which serves as comparison group.

By incorporating this comparison group of institutions, that might be affected by other events that could be influencing Tennessee institutions but not through the treatment (Tennessee Promise), I effectively increase internal validity and reduce the likelihood of omitted variable bias. Furthermore, by using the timing of an intervention as my source of plausibly exogenous variation, I am able to estimate the difference in post-implementation outcomes (enrollment and tuition and fees) for ineligible and for eligible Tennessee Promise institutions as compared to the institutions in the comparison group.

The standard difference-in-differences design is implemented in a regression framework that is presented in the equation below.

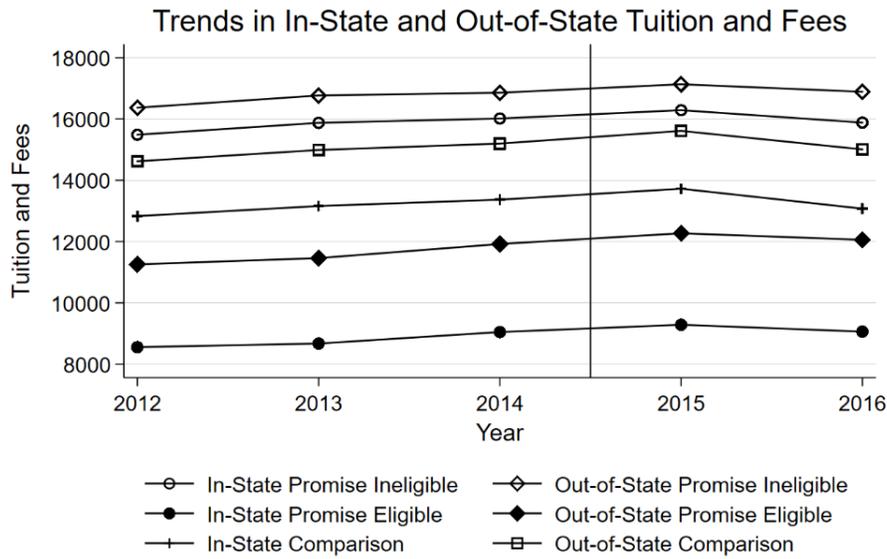
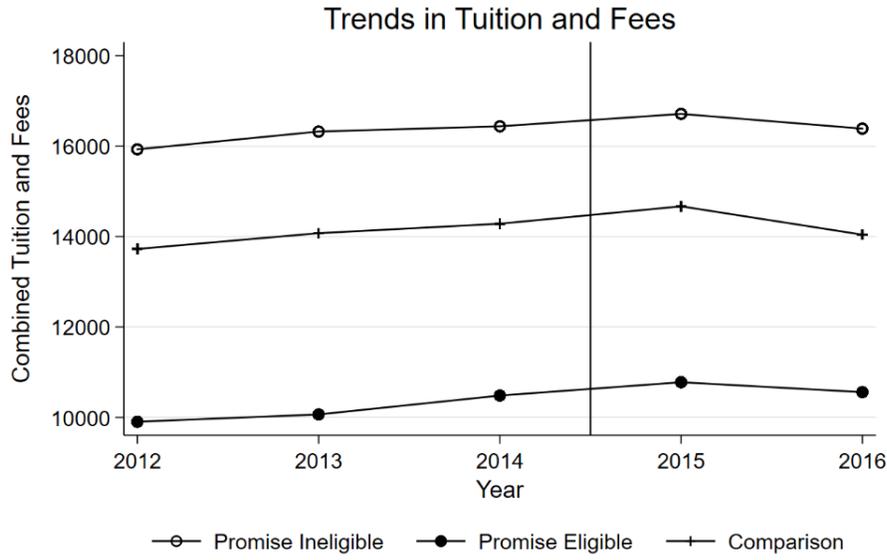
$$\text{Price}_{it} = \alpha + T_t + \text{Promise}_i + \beta(\text{Promise}_i * T_t) + \alpha_i + \lambda_t + \epsilon_{i,t} \quad (1)$$

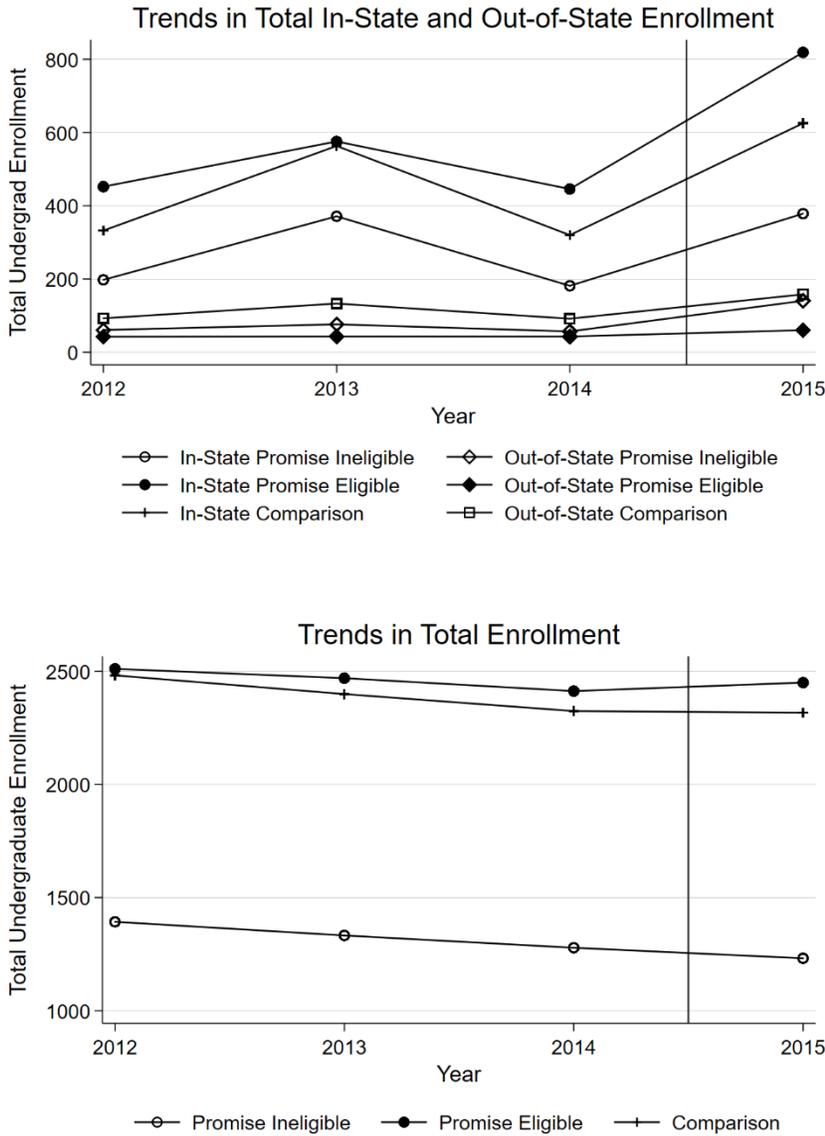
$$\text{Enroll}_{it} = \alpha + T_t + \text{Promise}_i + \beta(\text{Promise}_i * T_t) + \alpha_i + \lambda_t + \epsilon_{i,t} \quad (2)$$

In this model, the outcome variables ( $\text{Price}_{it}$  &  $\text{Enroll}_{it}$ ) are a function of a constant ( $\alpha$ ), an institution fixed effect ( $\alpha_i$ ), a year fixed effect ( $\lambda_t$ ), a set of covariates ( $X_{i,t}$ ), an error term ( $\epsilon_{i,t}$ ), and an interaction between a dummy for eligibility or ineligibility for Tennessee Promise funds ( $\text{Promise}_i$ ) and a dummy indicating post Promise implementation ( $T_t$ ). The models are conducted separately for eligible and ineligible institutions, with the parameter of interest ( $\beta$ ) revealing the association between Promise eligibility or ineligibility and the outcomes of interest. Institutional level covariates are not included in any of the models because the institutional fixed effect should capture this variation and residual variation should just be considered measurement error.

## Identification Assumptions

The primary identification assumption of the difference-in-differences research design is that in the absence of the Tennessee Promise, the outcomes of interest would have continued the trajectory observed in the pre-treatment years—this is commonly known as the parallel trends assumption. To ensure the estimates are unbiased and that observed changes are due to the Tennessee Promise and not pre-existing trends in outcome measures, I plot the trajectory of the key outcomes of interest for Promise eligible, Promise ineligible and comparison institutions in Figure 1. This figure provides preliminary evidence in support of the parallel trends assumption; neither of the treatment groups exhibit drastically different pre-treatment trends in tuition and fees and total enrollment compared to the comparison group. This suggests that in the absence of the Tennessee Promise, it is plausible to assume that the treatment and control groups would have continued along the same trajectory, and that any difference in outcomes after 2014-15 is due to the implementation of the Tennessee Promise.





**Figure 1.** Assessment of Parallel Trends in Institutions Impacted by Tennessee Promise and Institutions in the Comparison Group

Another important identification assumption of this design is that any relative shift in the outcomes are attributable to shifts in response to the implementation of the Promise program and not another policy that was implemented simultaneously. After researching the major reforms in Tennessee during the time period of study, I find that there are no simultaneous reforms that would likely bias the *tuition and fees* estimates. However, there were reforms targeting *enrollment* that could serve as a barrier to uncovering causal estimates. One of the major programs that could pose a threat to validity in the enrollment models is the Seamless Alignment and Integrated Learning Support (SAILS) program, which was implemented as a pilot at Chattanooga State Community College in 2012 and expanded in 2014. This program sought to increase college outcomes by improving remedial math education for community college students. However, the program was found to have no effect on college enrollment, so the effects I uncover in the difference-in-

differences estimates on enrollment are not driven by this simultaneously occurring program (Kane et al., 2020). The other key program that could pose a threat to validity is the Knox Achieves program—implemented for the class of 2009-10 Knox County high school graduates. This program caused an increase in two-year college enrollment (3-4 percentage points) and a decrease in four-year college enrollment (approximately 1 percentage point) among students in Knox County in cohorts 2009-10 through 2010-2011 (Carruthers & Fox, 2016). The Knox Achieves program was expanded to twenty-two counties after the 2011-12 cohort, and in 2014 the Tennessee Promise was enacted for the entire state. It is important to note that this means the Knox Achieves program was in place for some students during the cohorts prior to Tennessee Promise implementation. This introduces the possibility that because some students were already eligible for a tuition-free community college program in Tennessee in the pre-Tennessee Promise years, my estimates could have a downward bias. While it would be ideal to be able to isolate the students that were impacted by Knox Achieves in the pre-Tennessee Promise years, this is not possible with the institutional level data that I utilize in this study. Therefore, the treatment I measure is for the expansion of the tuition-free college programs in Tennessee to cover the state-wide population, rather than an isolated impact of one policy with no predecessor. In other words, I utilize the discontinuous timing of implementation in 2014—when the Knox Achieves program was already in place for seven cohorts of students—to estimate the effect of the state-wide expansion of tuition-free college in Tennessee. With this context in mind, I move to presenting the difference-in-differences estimates in the next section and describe the robustness checks and alternative specifications and multiple comparison groups thereafter.

### Enrollment Results

In Table 3, I present the difference-in-difference estimates for changes in enrollment among Promise eligible and ineligible institutions. First, the results are presented on the full sample of institutions. In the models on the full sample, the most striking result is the large and statistically significant positive increase in in-state enrollment at Promise eligible institutions. In contrast, the estimates for changes in enrollment at Promise ineligible institutions are insignificant. However, these average estimates of Tennessee Promise eligibility on all institutions mask significant heterogeneity that emerges when I distinguish between institutional sector.

Table 3

*Difference-in-Differences Estimates for Enrollment*

	Enrollment Counts			Percent Racial Minority	
	Total Enrollment	In-state	Out-of-State	% Black	% Hispanic
<b>All Institutions</b>					
<i>In-Eligible Institutions</i>					
Post * ineligible	48.46 (28.06)	-5.640 (10.56)	8.129 (5.833)	-0.013 (0.0089)	0.0029 (0.0027)
<i>Promise Eligible Institutions</i>					
Post * eligible	51.75 (55.31)	138.8** (30.64)	-0.435 (5.340)	-0.004 (0.003)	0.0033 (0.0019)
N	4411	3285	3285	3582	3582
N Institutions	928	908	908	927	927
<b>Public Institutions</b>					

<i>In-Eligible Institutions</i>					
Post * ineligible	-236.8 (227.6)	-139.8* (70.21)	69.41* (34.37)	0.0035 (0.0032)	-0.0023 (0.0012)
<i>Promise Eligible Institutions</i>					
Post * eligible	166.3 (85.25)	199.4** (38.78)	-9.692 (8.686)	-0.0043 (0.0032)	0.0009 (0.0021)
N	1380	1200	1200	1104	1104
N Institutions	277	273	273	277	277
<b>Private Institutions</b>					
<i>In-Eligible Institutions</i>					
Post * ineligible	28.38 (17.04)	5.149 (4.989)	7.524 (4.296)	-0.0170 (0.0097)	0.0047 (0.0030)
<i>Promise Eligible Institutions</i>					
Post * eligible	4.080 (57.58)	6.298 (23.66)	1.962 (7.382)	0.0074 (0.0063)	0.0041 (0.0042)
N	3031	2085	2085	2478	2478
N Institutions	651	635	635	650	650

Note: \*\* $p < .01$ ; \* $p < .05$  Robust standard errors clustered by institution in parentheses. The comparison group results are based on states that are bordering Tennessee and have similar higher education governance structures (i.e. coordinating boards instead of governing boards)

Next, I present the standard difference-in-difference estimates for public and private institutions in the bottom two panels of Table 3. First, when the sample is restricted to public institutions, enrollment shifts among public ineligible (four-year) universities become apparent. In particular, this analysis reveals that ineligible public (four-year) universities are facing large and statistically significant declines in in-state enrollment in post-implementation years. On the other hand, the ineligible public (four-year) universities are simultaneously experiencing a statistically significant increase in out-of-state enrollment. In contrast, enrollment at private ineligible institutions does not appear to be similarly impacted by the Promise policy. Together, these results suggest that there are significant enrollment shifts across sector after the Tennessee Promise was implemented.

### Tuition and Fees Results

Next, I present the difference-in-differences results for the impact of Tennessee Promise eligibility on tuition and fees in Table 4 below. [9] The vast majority of these estimates do not reach conventional statistical significance standards with the exception of average tuition and fees for ineligible institutions. This analysis reveals that ineligible Promise institutions appear to increase tuition and fees in post-Promise implementation years ( $p < 0.05$ ). However, given that these results are not consistent when utilizing an alternative comparison group (see Appendix Table A2), this finding should be interpreted with caution.

Table 4

#### *Difference-in-Differences Estimates for Price*

	Tuition and Fees			Required Fees	
	Average	In-state	Out-of-State	In-state	Out-of-State

<b>All Institutions</b>					
<i>In-Eligible Institutions</i>					
Post * ineligible	319.0*	238.0	63.36	-26.51	-40.03
	(161.5)	(213.6)	(271.4)	(31.89)	(32.57)
<i>Promise Eligible Institutions</i>					
Post * eligible	110.8	53.60	248.8	-52.22	-53.27
	(174.7)	(281.1)	(323.6)	(30.02)	(32.14)
N	4329	2895	2895	2895	2895
N Institutions	921	618	618	618	618
<b>Public Institutions</b>					
<i>In-Eligible Institutions</i>					
Post * ineligible	-819.4	-208.1	-1161.0	34.87	-1.212
	(526.3)	(175.8)	(1115.1)	(56.06)	(56.30)
<i>Promise Eligible Institutions</i>					
Post * eligible	617.8**	405.3**	750.6*	-112.1**	-121.2**
	(165.7)	(120.5)	(359.3)	(19.57)	(32.06)
N	1363	1100	1100	1100	1100
N Institutions	277	224	224	224	224
<b>Private Institutions</b>					
<i>In-Eligible Institutions</i>					
Post * ineligible	231.6	40.73	40.73	-15.40	-15.40
	(174.7)	(245.2)	(245.2)	(36.90)	(36.90)
<i>Promise Eligible Institutions</i>					
Post * eligible	-172.6	-118.3	-118.3	-5.415	-5.415
	(563.9)	(564.7)	(564.7)	(57.84)	(57.84)
N	2966	1795	1795	1795	1795
N Institutions	644	394	394	394	394

Note: \*\* $p < .01$ ; \* $p < .05$  Robust standard errors clustered by institution in parentheses. The comparison group results are based on states that are bordering Tennessee and have similar higher education governance structures (i.e. coordinating boards instead of governing boards)

When the sample is restricted to public institutions, the results suggest that Promise eligible public universities are increasing tuition and fees after the Tennessee Promise was implemented. These changes in tuition and fees suggests that public Promise eligible institutions may be lobbying THEC for increases in tuition so that they can keep up with the student services and administrative expenses that accompany large increases in enrollment. Additionally, and unexpectedly, these estimates suggest public eligible institutions are also lowering required fee levels in the aftermath of the Promise policy. However, the change in fees appears to be outweighed by the substantively large increase in tuition levels. Finally, private institutions do not exhibit significant changes in tuition and fees in post-Promise implementation years.

### Robustness Checks

The robustness checks, including an alternative comparison group assessment, and an analysis with institution-specific linear time trends are presented in Appendices A-B. [10] The analysis utilizing all states as the alternative comparison group is presented in Appendix A. These results are overall remarkably consistent which suggests that the results are not sensitive to changes in the comparison group. Indeed,

when using all states as the alternative comparison group, the shifting in-state and out-of-state enrollment at public eligible and ineligible colleges are consistent. Additionally, the findings reveal similar estimates regarding the increase in tuition and decrease in fees among public Promise eligible institutions. One interesting difference emerges, however, due to the increase in power. For ineligible private institutions, the decrease in black student enrollment is statistically significant in these models ( $p < 0.05$ ), suggesting that private ineligible institutions are experiencing a drop in black enrollment following the implementation of the Promise policy. Together, the consistency of these results provides more support for the findings regarding shifting enrollment and tuition in the aftermath of the Tennessee Promise.

Next, I conduct the difference-in-difference analysis with the addition of institution-specific linear time trends in Appendix B. This technique should account for unobserved heterogeneity that is not being captured in the institution and year fixed effects which should soak up residual variation. These models are encouragingly consistent with the results presented in the main analysis, which improves the confidence in the estimates presented above. In line with the results presented in Appendix A, ineligible private institutions experience a statistically significant decline in black student enrollment after the Tennessee Promise is implemented. Additionally, these results reveal the same increase in enrollment at public Promise eligible institutions and decrease in in-state enrollment at public Promise ineligible institutions. Moreover, the results for shifts in tuition and fees reveal the same increase in tuition at public Promise eligible institutions.

## Discussion

As expected, enrollment and tuition levels shifted significantly in the aftermath of the Tennessee Promise implementation in 2014. There are important caveats and context to consider when interpreting these findings. Given that Knox Achieves was already providing tuition-free community college for students in 22 different counties in Tennessee by 2012, my estimates reflect the changes in enrollment and price following the expansion of tuition-free college to the state level in 2014. Therefore, my estimates may have a downward bias due to students in the pre-implementation period already receiving the treatment in some counties. I encourage readers to interpret the findings with this context in mind and caution against causal interpretations given the potential for simultaneous reforms to bias the estimates. Nevertheless, the findings provide significant insight into the descriptive changes in tuition and enrollment in the aftermath of the Tennessee Promise among Promise eligible and Promise ineligible institutions. First, the findings reveal significant enrollment shifts across Promise eligible and ineligible institutions. Second, I find significant increases in tuition among public Promise eligible institutions after the Tennessee Promise was implemented.

To the first point, as expected, public Promise eligible institutions experienced large in-state enrollment gains, which is in line with previous research on Promise programs (Gurantz, 2020; Carruthers & Fox, 2016; Gandara & Li, 2018; Bartik et al., 2019; Page et al., 2018). It is important to note that these increases in in-state enrollment appear to be driven by surges in enrollment at *public* Promise eligible institutions, not *private* Promise eligible institutions. On the other hand, public Promise ineligible institutions (public four-year colleges) experienced significant decreases in in-state enrollment and a significant increase in out-of-state enrollment. This provides some evidence to suggest that students may be enrolling in Promise eligible public two-year colleges rather than public four-year colleges that are ineligible for Promise funds (Gurantz, 2020; Carruthers & Fox, 2016). Second, these findings support RDT and previous research, highlighting the tendency for administrators to recruit more out-of-state students (that pay higher tuition rates on average) to make up for declining in-state enrollment (Pfeffer & Salancik, 1978; Delaney & Kearney 2016). Taken together, these results likely reflect ineligible public organizations' attempting to ensure their fiscal stability and survival during a rapidly shifting higher education funding climate.

Next, the findings reveal significant increases in tuition among public Promise eligible institutions, which provides support for the Bennett hypothesis. It is not entirely surprising that Promise eligible public

institutions, that are likely already under-resourced (Deming & Walters, 2017), raise tuition and fees in response to the availability of state subsidies. However, based on previous research that finds private institutions to be particularly susceptible to behavior in line with the Bennett hypothesis, it is surprising that public institutions instead of private institutions are raising tuition. This is particularly surprising because in Tennessee public institutions must convince state higher education leaders that they need additional funding in order to be able to raise tuition and fees levels. Therefore, it could also be the case that Promise institutions are attempting to raise more revenue through tuition and fees due to the increased cost of administration and student services following explosive growth in enrollment.

Finally, in line with previous research, racial and ethnic minority enrollment shifted following the implementation of the Tennessee Promise policy (Dynarski, 2000; Scott-Clayton, 2011; St. John & Noell, 1989). Specifically, the percentage of Black students at private Promise ineligible institutions declined by around 1-2 percentage points. Therefore, it is possible that the financial incentives were particularly impactful for Black students, which would align with recent research on free community college programs (Gandara & Li, 2018). These enrollment shifts could potentially have an impact on the racial and ethnic diversity at both Promise eligible and ineligible institutions, which should be explored in future research. Yet again, this reflects another potential consequence of Promise policies that should be considered when determining which institutions are eligible and ineligible for Promise funds.

## Conclusion

In the wake of rapidly diffusing tuition-free community college policies, it is essential for scholars to better understand the likely consequences of design choices such as limiting institutional eligibility for Promise funds. Based on the results above, two main insights from this study should guide future discussions of institutional eligibility.

First, shifting student enrollment behavior in the aftermath of Promise program implementation can fundamentally shift the incentives and constraints that institutions face, which can translate to changing institutional behavior. As more students attend Promise eligible institutions ineligible institutions bear the brunt of these shifts in resource constraints, which has serious implications for institutional behavior. In fact, in a recent interview, the president of the University of Tennessee-Martin said that administrators are working to counter displaced enrollment by recruiting out-of-state students and incentivizing students to transfer from eligible Tennessee Promise institutions (Tamburin, 2015). In line with these comments, my findings do suggest that there was significant enrollment shifts across institutions that were eligible and ineligible to receive Promise funds. Indeed, the most striking results reveal the substantial decline in enrollment at ineligible public (four-year) universities, as well as the displacement of racial and ethnic minority student enrollment away from private ineligible institutions. This could be problematic if by only allowing Promise aid to flow to mainly two-year institutions, we encourage highly qualified students to undermatch (Smith et al., 2013; Pallais & Turner, 2006; Hoxby & Avery, 2013; Dillon & Smith, 2017). Furthermore, scholars are beginning to question whether only incentivizing attendance at institutions with the fewest resources (community colleges) will not increase college attainment as originally intended (Deming, 2017). This is particularly problematic given the vast increases in enrollment at low resource institutions, that may not be able to offer the same level of quality services in the face of rapid student enrollment growth (Deming, 2017).

Second, eligibility for Promise funds may lead to increases in tuition and fees, especially due to the nature of the policy design. In-state students no longer have to worry about the sticker price of tuition and fees if they meet the eligibility requirements for the program, which leaves Promise eligible institutions without much incentive to control tuition levels. However, given that the institutions that were raising tuition are public Promise eligible universities that have to work with state officials, this finding likely reveals

the cooperation between these universities and the coordinating board in Tennessee to recognize the increased cost of delivering services in the midst of rapid increases in student enrollment.

Moving forward, scholars should investigate the effects of limiting institutional eligibility in other state and local contexts, such as New York and Kentucky. Expanding these types of analyses will enable a better scholarly understanding of the ways in which institutions of higher education respond to free-tuition programs when they are excluded from eligibility. Finally, researchers should utilize individual-level data to investigate the undermatch hypothesis in the context of free-tuition policies in which only two-year universities are eligible.

### Implications for Practice

There are three main takeaways from the findings. First, I find that after the Tennessee Promise was implemented, students flocked to public Promise eligible institutions (mainly public two-year and technical colleges). In contrast, public four-year universities that were ineligible to receive Promise funds experienced decreases in in-state enrollment and increases in out-of-state enrollment. Third, public Promise eligible institutions (mainly public two-year and technical colleges) raised tuition after the Tennessee Promise was implemented.

- **Policy decisions regarding which colleges can receive Promise funds will shape student enrollment decisions.** If Promise policies only provide funds for two-year degrees, students who may have attended a four-year college may be diverted to a two-year community or technical college. Given that community and technical colleges have lower levels of per pupil funding and attainment rates, this diversion of enrollment could undermine the goals of Promise programs and suppress bachelor's degree attainment.
- **Four-year colleges ineligible for Promise funds may need to enact revenue enhancing measures to offset corresponding budget deficits if in-state enrollment declines.** In the context of Tennessee, public four-year colleges ineligible for Promise funds appear to have recruited more out-of-state students to offset the in-state enrollment shortfall. Other possible strategies could be articulation agreements with two-year colleges that minimize the loss of credit hours and ensure a smooth transition to four-year colleges for transfer students.
- **Colleges that are eligible for Promise funds may raise prices to capture additional state subsidies.** With the rise in government subsidies to students, institutions may be incentivized to raise prices to secure and enhance revenue streams. It is possible that colleges experiencing sharp increases in enrollment due to Promise programs could face capacity constraints and may raise prices to expand capacity for additional student support services and administration expenses.

### Notes

[1] See [College Promise](#) for a detailed description of all the states, regions and localities that have implemented these Promise policies.

[2] The difference between the number of applicants and recipients reflects the number of students that did not meet eligibility requirements, or attended colleges outside of Tennessee Promise eligibility, or those students who did not end up enrolling in college full-time or at all.

[3] The Knox Achieves program was the regional last-dollar scholarship in Knox County, Tennessee that motivated the passage of the Tennessee Promise.

[4] Even for those students whose tuition and fees would have been covered by Pell grants, the messaging of free community college may also induce higher levels of enrollment, even though these students don't receive any additional financial aid.

[5] This measure includes both institutions reporting tuition and fees at the institutional level, and the program level. I utilize combined tuition and fees due to the lack of isolated tuition measures for institutions reporting by program. To combine these measures, I take the tuition and fees of the largest program at the latter type of institution as the proxy measure of tuition and fees at these institutions. It should be noted that the tuition and fees data is limited by its inability to capture within institution variation tuition and fees levels by program. In the measure of tuition and fees, the annual tuition and fees of the largest program are presented for the institutions reporting by program. This may mask variation among tuition levels by the type of program, but the data does provide an annual average tuition and fees that differentiates between in-state and out-of-state students.

[6] I also run the analysis without the institutions that switch from Promise eligible to ineligible or vice versa. These results are available upon request.

[7] These states are Alabama, Kentucky, Arkansas, Virginia, Missouri, and South Carolina. Based on the work of policy diffusion scholars (Shipan and Volden 2008) and higher education policy scholars on governance structures (Knott and Payne 2004), this comparison group should (and does) provide the best approximation of a hypothetical counterfactual to Tennessee institutions.

[8] For all of the models, standard errors are clustered at the institution level in accordance with the best practices advocated by Bertrand et al. (2002).

[9] It should be noted that private institutions did not indicate a difference between in-state and out-of-state tuition and fee measures. Thus, these results do not give us an idea of whether the tuition and fees varies for in-state and out-of-state students.

[10] I have also conducted an event-study analysis in which I can formally test for the presence of pre-treatment trends. The results of these models are available upon request. I had to remove them due to the length restrictions in the submission guidelines.

## References

- Andrews, R. J., DesJardins, S., & Ranchhod, V. (2010). The effects of the Kalamazoo Promise on college choice. *Economics of Education Review*, 29(5), 722–737.  
<https://doi.org/10.1016/j.econedurev.2010.05.004>
- Bartik, T. J., Hershbein, B. J., & Lachowska, M. (2015). *The Effects of the Kalamazoo Promise Scholarship on College Enrollment, Persistence, and Completion* (SSRN Scholarly Paper ID 2624727). Social Science Research Network. <https://papers.ssrn.com/abstract=2624727>
- Baum, S., Ma, J., Bell, D., & Elliott, D. C. (2014). *Trends in College Pricing, 2014. Trends in Higher Education Series*. College Board. <https://eric.ed.gov/?id=ED572551>
- Belasco, A. S., & Trivette, M. J. (2015). Aiming Low: Estimating the Scope and Predictors of Postsecondary Undermatch. *The Journal of Higher Education*, 86(2), 233–263.  
<https://doi.org/10.1080/00221546.2015.11777363>
- Bertrand, M., Duflo, E., & Mullainathan, S. (2004). How Much Should We Trust Differences-In-Differences Estimates? *The Quarterly Journal of Economics*, 119(1), 249–275.  
<https://doi.org/10.1162/003355304772839588>
- Carruthers, C. K., & Fox, W. F. (2016). Aid for all: College coaching, financial aid, and post-secondary persistence in Tennessee. *Economics of Education Review*, 51, 97–112.  
<https://doi.org/10.1016/j.econedurev.2015.06.001>
- Chen, R., & DesJardins, S. L. (2010). Investigating the Impact of Financial Aid on Student Dropout Risks: Racial and Ethnic Differences. *Journal of Higher Education*, 81(2), 179–208.  
<https://doi.org/10.1353/jhe.0.0085>
- College Promise Campaign. (2017). About the College Promise Movement. [Http://College%20Promise.org](http://College%20Promise.org)  
<http://collegepromise.org/the-promise/>
- Collins, C. (2017). “Free Tuition” Proposals Modestly Credit Positive For Sector; Poised to Expand. *Moody’s Investors Service, Higher Education*, 5.
- Curs, B. R., & Dar, L. (2010a). *Does State Financial Aid Affect Institutional Aid? An Analysis of the Role of State Policy on Postsecondary Institutional Pricing Strategies* (SSRN Scholarly Paper ID 1641489). Social Science Research Network. <https://papers.ssrn.com/abstract=1641489>
- Curs, B. R., & Dar, L. (2010b). *Do Institutions Respond Asymmetrically to Changes in State Need- and Merit-Based Aid?* (SSRN Scholarly Paper ID 1702504). Social Science Research Network.  
<https://papers.ssrn.com/abstract=1702504>
- Delaney, J. A., & Kearney, T. D. (2016). Alternative Student-Based Revenue Streams for Higher Education Institutions: A Difference-in-Difference Analysis Using Guaranteed Tuition Policies. *The Journal of Higher Education*, 87(5), 731–769. <https://doi.org/10.1080/00221546.2016.11777420>
- Delaney, Jennifer, & Hemenway, Bradley. 2017. “Inside the Black Box: A Difference-in-Difference Analysis of Shifts in Postsecondary Institution Spending Patterns in Response to “Promise” Financial Aid Programs.” Paper presented at the Association of Education Finance and Policy.

- Deming, D. (2017, April 26). Increasing college completion with a federal higher education matching grant. *Brookings*. <https://www.brookings.edu/research/increasing-college-completion-with-a-federal-higher-education-matching-grant/>
- Deming, D., & Dynarski, S. (2009). *Into College, Out of Poverty? Policies to Increase the Postsecondary Attainment of the Poor* (No. w15387). National Bureau of Economic Research. <https://doi.org/10.3386/w15387>
- Deming, David & Dynarski, Susan. 2010. "College aid", in *Targeting Investments in Children: Fighting Poverty When Resources are Limited*, ed. by P. B. Levine and D. J. Zimmerman, Chicago, IL: University of Chicago Press, chap. 10, 283–302.
- Deming, D. J., & Walters, C. R. (2017). *The Impact of Price Caps and Spending Cuts on U.S. Postsecondary Attainment* (Working Paper No. 23736). National Bureau of Economic Research. <https://doi.org/10.3386/w23736>
- Dillon, E. W., & Smith, J. A. (2016). Determinants of the Match between Student Ability and College Quality. *Journal of Labor Economics*, 35(1), 45–66. <https://doi.org/10.1086/687523>
- Doyle, W. R., Delaney, J. A., & Naughton, B. A. (2009). Does Institutional Aid Compensate for or Comply with State Policy? *Research in Higher Education*, 50(5), 502–523. <https://doi.org/10.1007/s11162-009-9126-y>
- Dynarski, S. (2000). *Hope for Whom? Financial Aid for the Middle Class and Its Impact on College Attendance* (Working Paper No. 7756). National Bureau of Economic Research. <https://doi.org/10.3386/w7756>
- Dynarski, S. M. (2003). Does Aid Matter? Measuring the Effect of Student Aid on College Attendance and Completion. *The American Economic Review*, 93(1), 279–288.
- Furquim, F., Corral, D., & Hillman, N. (2019) A primer for interpreting and designing difference-in-differences studies in higher education research. *Higher Education: Handbook of Theory and Research*, 35 Dordrecht: Springer.
- Gandara, D., & Li, A. (2018). *How Promise programs for two-year colleges affect different student subgroups*. American Educational Research Association, New York City, NY.
- Gurantz, O. (2020). What Does Free Community College Buy? Early Impacts from the Oregon Promise. *Journal of Policy Analysis and Management*. <https://doi.org/10.1002/pam.22157>
- Harris, D., Farmer-Hinton, R., Kim, D., Diamond, J., Blakely Reavis, T., Krupa Rifelj, K., Lustick, H., & Carl, B. (2018). *The promise of free college (and its potential pitfalls): Evidence on the design, implementation, and effects of a performance-based college aid program from a randomized control trial*. Brookings Center on Education Policy. [https://www.brookings.edu/wp-content/uploads/2018/09/GS\\_9202018\\_Free-College.pdf](https://www.brookings.edu/wp-content/uploads/2018/09/GS_9202018_Free-College.pdf)
- Hoxby, C., & Avery, C. (2013). The Missing "One-Offs": The Hidden Supply of High-Achieving, Low-Income Students. *Brookings Papers on Economic Activity*, 2013(1), 1–65. <https://doi.org/10.1353/eca.2013.0000>

- Jackson, G. A. (1990). Financial Aid, College Entry, and Affirmative Action. *American Journal of Education*, 98(4), 523–550.
- John, E. P. St., & Noell, J. (1989). The effects of student financial aid on access to higher education: An analysis of progress with special consideration of minority enrollment. *Research in Higher Education*, 30(6), 563–581. <https://doi.org/10.1007/BF00992391>
- Kane, T. J., Boatman, A., Kozakowski, W., Bennett, C., Hitch, R., & Weisenfeld, D. (2018). Remedial Math Goes to High School: An evaluation of the Tennessee SAILS program. [Research Report]. Center for Education Policy Research, Harvard University.
- Knott, J. H., & Payne, A. A. (2004). The impact of state governance structures on management and performance of public organizations: A study of higher education institutions. *Journal of Policy Analysis and Management*, 23(1), 13–30. <https://doi.org/10.1002/pam.10176>
- LeGower, M., & Walsh, R. (2017). Promise scholarship programs as place-making policy: Evidence from school enrollment and housing prices. *Journal of Urban Economics*, 101(Supplement C), 74–89. <https://doi.org/10.1016/j.jue.2017.06.001>
- Long, B. T. (2004). How do Financial Aid Policies Affect Colleges? The Institutional Impact of the Georgia HOPE Scholarship. *Journal of Human Resources*, XXXIX(4), 1045–1066. <https://doi.org/10.3368/jhr.XXXIX.4.1045>
- Long, B. T. (2008). *What is Known about the Impact of Financial Aid? Implications for Policy. An NCPRE Working Paper*. National Center for Postsecondary Research. <https://eric.ed.gov/?id=ED501555>
- Lovenheim, M., & Owens, E. (2014). Does federal financial aid affect college enrollment? Evidence from drug offenders and the Higher Education Act of 1998. *Journal of Urban Economics*, 81(C), 1–13.
- Lowry, R. C. (2001). Governmental Structure, Trustee Selection, and Public University Prices and Spending: Multiple Means to Similar Ends. *American Journal of Political Science*, 45(4), 845–861. <https://doi.org/10.2307/2669328>
- McBain, L. (2011). State Need-Based and Merit-Based Grant Aid: Structural Intersections and Recent Trends. *American Association of State Colleges and Universities*, 8.
- McLendon, M. K., Tandberg, D. A., & Hillman, N. W. (2014). Financing College Opportunity: Factors Influencing State Spending on Student Financial Aid and Campus Appropriations, 1990 through 2010. *The ANNALS of the American Academy of Political and Social Science*, 655(1), 143–162. <https://doi.org/10.1177/0002716214540849>
- Miller-Adams, M. (2015). *Promise Nation: Transforming Communities through Place-Based Scholarships*. Upjohn Press. <https://doi.org/10.17848/9780880995061>
- Morgan, S. L., & Winship, C. (2007). *Counterfactuals and Causal Inference: Methods and Principles for Social Research* (1 edition). Cambridge University Press.
- National Conference of State Legislators. (2016). Free Community College. Retrieved from <http://www.ncsl.org/research/education/free-community-college.aspx>
- Nguyen, H. (2019). Free tuition and college enrollment: Evidence from New York’s Excelsior program. *Education Economics*, 27(6), 573–587. <https://doi.org/10.1080/09645292.2019.1652727>

- Page, L. C., Iriti, J. E., Lowry, D. J., & Anthony, A. M. (2018). The Promise of Place-Based Investment in Postsecondary Access and Success: Investigating the Impact of the Pittsburgh Promise. *Education Finance and Policy*, 1–60. [https://doi.org/10.1162/edfp\\_a\\_00257](https://doi.org/10.1162/edfp_a_00257)
- Pallais, A., & Turner, S. (2006). Opportunities for Low Income Students at Top Colleges and Universities: Policy Initiatives and the Distribution of Students. *National Tax Journal*, 59(2), 357–386.
- Pfeffer, J., & Salancik, G. R. (1978). *The External Control of Organizations: A Resource Dependence Perspective*. Harper & Row.
- Pluhta, E. A., & Penny, G. R. (2013). The Effect of a Community College Promise Scholarship on Access and Success. *Community College Journal of Research and Practice*, 37(10), 723–734. <https://doi.org/10.1080/10668926.2011.592412>
- Rizzo, M. J., & Ehrenberg, R. G. (2003). *Resident and Nonresident Tuition and Enrollment at Flagship State Universities* (Working Paper No. 9516). National Bureau of Economic Research. <https://doi.org/10.3386/w9516>
- Rodriguez, A. (2015). Tradeoffs and Limitations: Understanding the Estimation of College Undermatch. *Research in Higher Education*, 56(6), 566–594. <https://doi.org/10.1007/s11162-015-9363-1>
- Scott-Clayton, J. (2011). On Money and Motivation: A Quasi-Experimental Analysis of Financial Incentives for College Achievement. *Journal of Human Resources*, 46(3), 614–646.
- Shipan, C. R., & Volden, C. (2008). The Mechanisms of Policy Diffusion. *American Journal of Political Science*, 52(4), 840–857. <https://doi.org/10.1111/j.1540-5907.2008.00346.x>
- Singell, L. D., & Stone, J. A. (2007). For whom the Pell tolls: The response of university tuition to federal grants-in-aid. *Economics of Education Review*, 26(3), 285–295. <https://doi.org/10.1016/j.econedurev.2006.01.005>
- Sjoquist, D. L., & Winters, J. V. (2012). Building the Stock of College-Educated Labor Revisited. *Journal of Human Resources*, 47(1), 270–285. <https://doi.org/10.3368/jhr.47.1.270>
- Smith, J., Pender, M., & Howell, J. (2013). The full extent of student-college academic undermatch. *Economics of Education Review*, 32, 247–261. <https://doi.org/10.1016/j.econedurev.2012.11.001>
- Swanson, E., & 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). <https://ir.library.louisville.edu/jsfa/vol49/iss3/2>
- Tamburin, A. (2015). College enrollment jumps under TN Promise. *The Tennessean*. Retrieved from <http://www.tennessean.com/story/news/education/2015/09/11/college-enrollment-jumps-under-tn-promise/72096194/>
- Tennessee Department of Education. (2015). Tennessee Promise: Frequently Asked Questions. Retrieved from <http://bit.ly/2lcpgq7>
- Tennessee Department of Education. (2017). The Tennessee Promise. Retrieved from <http://tnpromise.gov/about.shtml>

- Toutkoushian, R. K., & Shafiq, M. N. (2010). A Conceptual Analysis of State Support for Higher Education: Appropriations versus Need-Based Financial Aid. *Research in Higher Education, 51*(1), 40–64.
- Turner, N. (2012). Who benefits from student aid? The economic incidence of tax-based federal student aid. *Economics of Education Review, 31*(4), 463–481. <https://doi.org/10.1016/j.econedurev.2011.12.008>

## Appendix

## Appendix A: Robustness Analysis with Alternative Comparison Group

Table A1. Difference-in-Differences Estimates for Enrollment with All States as Comparison Group

	Enrollment Counts			Percent Racial Minority	
	Total Enrollment	In-state	Out-of-State	% Black	% Hispanic
<b>All Institutions</b>					
<i>In-Eligible Institutions</i>					
Post * ineligible	13.36 (21.45)	-21.45 (15.25)	7.707 (8.174)	-0.015 (0.0094)	-0.00286 (0.00283)
<i>Promise Eligible Institutions</i>					
Post * eligible	15.64 (39.87)	156.7** (44.02)	4.180 (5.505)	-0.0032 (0.0028)	-0.00312 (0.00167)
N	26975	18360	18360	26975	26975
N Institutions	7065	6777	6777	7065	7065
<b>Public Institutions</b>					
<i>In-Eligible Institutions</i>					
Post * ineligible	-316.6 (215.8)	-153.2** (57.06)	61.34* (23.35)	-0.001 (0.0034)	-0.0087** (0.00110)
<i>Promise Eligible Institutions</i>					
Post * eligible	83.75 (58.00)	218.9** (56.67)	-1.063 (7.165)	-0.004 (0.0028)	-0.003 (0.002)
N	7780	6248	6248	7780	7780
N Institutions	1967	1934	1934	1967	1967
<b>Private Institutions</b>					
<i>In-Eligible Institutions</i>					
Post * ineligible	15.31 (16.49)	-4.974 (6.885)	2.027 (5.313)	-0.0167* (0.0051)	-0.00125 (0.00304)
<i>Promise Eligible Institutions</i>					
Post * eligible	-37.16 (41.78)	8.464 (5.116)	6.863 (5.708)	0.0018 (0.0054)	-0.00249 (0.00282)
N	3031	2085	2085	2478	2478
N Institutions	651	635	635	650	650

Note: \*\*  $p < .01$ ; \*  $p < .05$  Robust standard errors clustered by institution in parentheses. These results utilize institutions in all other states as the comparison group.

**Table A2.** Difference-in-Differences Estimates for Price with All States as Comparison Group

	Tuition and Fees			Required Fees	
	Average	In-state	Out-of-State	In-state	Out-of-State
<b>All Institutions</b>					
<i>In-Eligible Institutions</i>					
Post * ineligible	-15.56 (242.5)	93.92 (226.4)	-125.0 (284.8)	-27.19 (32.54)	-29.77 (33.46)
<i>Promise Eligible Institutions</i>					
Post * eligible	26.00 (237.1)	-33.33 (232.5)	85.33 (255.6)	11.16 (28.22)	17.64 (30.02)
N	20116	20116	20116	19974	19974
N Institutions	4454	4454	4454	4312	4312
<b>Public Institutions</b>					
<i>In-Eligible Institutions</i>					
Post * ineligible	-607.3 (593.8)	6.753 (156.5)	-1,221 (1,260)	83.88 (64.16)	73.17 (64.57)
<i>Promise Eligible Institutions</i>					
Post * eligible	598.2** (157.7)	462.0** (90.13)	734.3** (272.6)	-44.23* (19.92)	-28.54 (32.79)
N	8006	8006	8006	8006	8006
N Institutions	1641	1641	1641	1641	1641
<b>Private Institutions</b>					
<i>In-Eligible Institutions</i>					
Post * ineligible	-323.7 (255.8)	-323.7 (255.8)	-323.7 (255.8)	-39.04 (35.04)	-39.04 (35.04)
<i>Promise Eligible Institutions</i>					
Post * eligible	-392.7 (399.2)	-392.7 (399.2)	-392.7 (399.2)	53.38 (45.84)	53.38 (45.84)
N	11967	11967	11967	11967	11967
N Institutions	2670	2670	2670	2670	2670

Note: \*\* p < .01; \* p < .05 Robust standard errors clustered by institution in parentheses. These results utilize institutions in all other states as the comparison group.

**Appendix B: Robustness Analysis- Results with Institution-Specific Linear Time Trends**

**Table 1B.** Difference-in-Differences Enrollment Estimates with Linear Specific Time Trends

	Enrollment Counts			Percent Racial Minority	
	Total Enrollment	In-state	Out-of-State	% Black	% Hispanic
<b>All Institutions</b>					
<i>In-Eligible Institutions</i>					
Post * ineligible	5.88 (17.31)	-19.62 (11.45)	2.82 (4.71)	-0.028** (0.013)	0.0025 (0.004)
<i>Promise Eligible Institutions</i>					
Post * eligible	82.19** (30.04)	135.24** (38.54)	1.14 (4.64)	0.003 (0.005)	0.006 (0.002)
N	4411	3285	3285	3582	3582
N Institutions	928	908	908	927	927

<b>Public Institutions</b>					
<i>In-Eligible Institutions</i>					
Post * ineligible	6.270 (204.0)	-177.1** (42.63)	13.90 (15.74)	0.00783* (0.0034)	-0.0022 (0.0014)
<i>Promise Eligible Institutions</i>					
Post * eligible	117.3** (41.88)	175.5** (47.08)	1.983 (5.914)	-0.0013 (0.0056)	-0.0022 (0.0025)
N	1380	1200	1200	1104	1104
N Institutions	277	273	273	277	277
<b>Private Institutions</b>					
<i>In-Eligible Institutions</i>					
Post * ineligible	10.81 (11.66)	4.569 (7.370)	1.579 (5.288)	-0.028* (0.0132)	0.0029 (0.0039)
<i>Promise Eligible Institutions</i>					
Post * eligible	-15.14 (30.19)	14.57 (29.23)	0.688 (9.064)	0.0074 (0.0087)	0.0055 (0.0037)
N	3031	2085	2085	2478	2478
N Institutions	651	635	635	650	650

Note: \*\*  $p < .01$ ; \*  $p < .05$  Robust standard errors clustered by institution in parentheses. The comparison group results are based on states that are bordering Tennessee and have similar higher education governance structures (i.e. coordinating boards instead of governing boards).

**Table 2B.** Difference-in-Differences Price Estimates with Linear Specific Time Trends

	Tuition and Fees			Required Fees	
	Average	In-state	Out-of-State	In-state	Out-of-State
<b>All Institutions</b>					
<i>In-Eligible Institutions</i>					
Post * ineligible	236.5 (184.6)	73.43 (204.4)	16.41 (294.1)	-1.090 (32.32)	-2.836 (32.33)
<i>Promise Eligible Institutions</i>					
Post * eligible	298.2 (200.8)	58.86 (297.7)	34.74 (345.6)	14.55 (36.12)	10.78 (36.27)
N	4329	2895	2895	2895	2895
N Institutions	921	618	618	618	618
<b>Public Institutions</b>					
<i>In-Eligible Institutions</i>					
Post * ineligible	-1,607* (585.8)	-885.9** (257.6)	-1,931 (1,224)	-91.32** (27.17)	-93.23** (28.01)
<i>Promise Eligible Institutions</i>					
Post * eligible	858.5** (202.9)	601.9** (167.1)	616.7 (417.1)	-7.295 (18.99)	-15.78 (19.58)
N	1363	1100	1100	1100	1100
N Institutions	277	224	224	224	224
<b>Private Institutions</b>					

<i>In-Eligible Institutions</i>					
Post * ineligible	288.8 (199.6)	93.21 (222.1)	93.21 (222.1)	-0.853 (37.60)	-0.853 (37.60)
<i>Promise Eligible Institutions</i>					
Post * eligible	-471.3 (588.6)	-418.5 (581.5)	-418.5 (581.5)	46.62 (69.65)	46.62 (69.65)
N	2966	1795	1795	1795	1795
N Institutions	644	394	394	394	394

Note: \*\*  $p < .01$ ; \*  $p < .05$  Robust standard errors clustered by institution in parentheses. The comparison group results are based on states that are bordering Tennessee and have similar higher education governance structures (i.e. . coordinating boards instead of governing boards)