



# Jackpot? The impact of lottery scholarships on enrollment in Tennessee<sup>☆</sup>



Donald J. Bruce<sup>a</sup>, Celeste K. Carruthers<sup>b,\*</sup>

<sup>a</sup> University of Tennessee, 722 Stokely Management Center, Knoxville, TN 37996-0570, United States

<sup>b</sup> University of Tennessee, 702 Stokely Management Center, Knoxville, TN 37996-0570, United States

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## ABSTRACT

We identify how the cost of college shapes high school graduates' choice of college state and sector by exploiting discontinuous eligibility criteria for broad-based merit scholarships in Tennessee. For students whose ACT is a decisive factor in their scholarship eligibility, reductions in college cost result in substitution away from two-year community colleges in favor of four-year institutions. This pattern is more prominent among lower income students, and treatment effects are limited to a very local window around the qualifying threshold. We find no evidence that the scholarship affects college-going at the eligibility margin, little to no evidence of substitution between in-state and out-of-state colleges, and no evidence of substitution between public and private universities. Even so, results demonstrate that merit aid encompassing the middle of the ability spectrum can improve the quality of colleges students choose to attend.

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## 1. Introduction

The relative return to a college degree has risen steeply since the early 1980s. Earnings for college graduates are largely unchanged in real terms, but the value of a high school degree is considerably lower (Deming and Dynarski, 2010; Levy and Murnane, 1992). The cost of attending college, however, has far outpaced inflation in recent years, limiting students' feasible set of colleges. Federal and state governments have a long history of reducing college cost through various policy levers, but it is not entirely clear if these levers effectively increase student demand for college *per se* or improve student access to better colleges.

A large body of research exploits quasi-experiments in need-based and merit-based aid to demonstrate that the own-price elasticity of enrolling in particular institutions is significant

(van der Klauuw, 2002; Linsenmeier et al., 2006) and that financial aid increases the likelihood of enrolling in *any* college (Dynarski, 2000, 2003; Seftor and Turner, 2002; Kane, 2003; Cornwell et al., 2006). The question of how sensitive potential college students are to the cost of attendance is far from settled, however, as evidenced by mixed results for the effectiveness of federal Pell grants (Hansen, 1983; Kane, 1995; Seftor and Turner, 2002; Bettinger, 2004; Rubin, 2011). In a review of this area of literature, Deming and Dynarski (2010) point to transparent financial aid programs as being the most effective at increasing college enrollment and persistence. It is less clear how the cost of college affects students on the margin between different sectors of higher education. This is a particularly critical scarcity in the literature, given that research has demonstrated large returns to four-year college attendance and to college selectivity more generally (Hoekstra, 2009; Deming et al., 2012; Andrews et al., 2012; Reynolds, 2012), albeit with the caveat that unobserved student aptitude explains much of (and for some groups of students, all of) the estimated returns to college quality (Dale and Krueger, 2002, 2011).

Does financial aid impact a student's decision to attend a four-year versus two-year school, or a public versus private school? Limited research in this area suggests that students' self-reported college preferences are sensitive to cost (Avery and Hoxby, 2004), that public tuition waivers yield substitution out of the private sector and into lower-quality colleges than students would have otherwise attended (Goodman, 2008; Cohodes and Goodman, 2012), and that grants reducing the relative price of private tuition

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\* Corresponding author.

E-mail addresses: [dbruce@utk.edu](mailto:dbruce@utk.edu) (D.J. Bruce), [carruthers@utk.edu](mailto:carruthers@utk.edu) (C.K. Carruthers).

result in substitution into the private sector (Kane, 2003). Descriptive analysis of enrollment behavior before and after implementation of Georgia's HOPE scholarship (Dynarski, 2000) and the Washington, D.C. Tuition Assistance Grant (Abraham and Clark, 2006), both available to average students, suggests that reducing the cost of college can push some would-be two-year students into four-year colleges and universities.

We advance this body of work by identifying the local impact of Tennessee HOPE scholarship eligibility on an exhaustive set of matriculation possibilities. Tennessee HOPE scholarships are part of a growing class of generous and broad-based merit aid available to "students with solid although not necessarily exemplary academic records" (Dynarski, 2004). Financed by in-state sources (often lottery revenues), broad-based merit aid programs are intended to increase residents' access to college broadly, but also to incentivize bright, college-going students to stay in their home state. Tennessee HOPE scholarships can be applied toward tuition at in-state public and private colleges, and eligibility criteria are accessible to students with near-average ACT aptitude. Our regression discontinuity identification strategy focuses on students very close to the eligibility threshold, and in contrast to recent studies of a Massachusetts policy targeting high-achieving students (Goodman, 2008; Cohodes and Goodman, 2012), we find that merit scholarships encompassing the middle of the ability spectrum modestly improve the selectivity of colleges that marginally eligible students attend.

Ours is not the first study to focus on Tennessee's merit aid program. Pallais (2009) shows that the introduction of HOPE raised student ACT scores but had no discernible effect on self-reported, *ex ante* preferences for in-state versus out-of-state colleges. We test whether *ex post* out-of-state enrollment as well as other matriculation outcomes are affected by HOPE eligibility. Specifically, we exploit discontinuous eligibility criteria tied to ACT scores to test for the net change in the propensity to attend college at all, to enroll out of state, or to enroll in particular sectors of higher education. We employ students' first ACT score as the running variable, since it is evident that repeated attempts lead to best ACT scores that are unevenly distributed around the qualifying threshold. First ACT scores and students' pre-college controls (with one exception we discuss in Section 4) are smoothly distributed over the HOPE eligibility margin. College choice findings indicate that for students whose ACT score is decisive in their HOPE eligibility, the likelihood of attending any college does not significantly change, nor does the likelihood of attending an eligible in-state private college or university. We find weak and inconsistent evidence that HOPE eligibility decreases the likelihood of enrolling out of state.

We do observe substitution out of two-year colleges and into four-year colleges at the HOPE eligibility margin, however, and this pattern is most prominent among Pell-eligible students and the lower-income half of the sample. These results are consistent with a steep income or wealth gradient dictating the choice between two-year and four-year schools, echoing findings by Lovenheim and Reynolds (Lovenheim and Reynolds, 2011, 2013). We go onto show that for students at the threshold of HOPE eligibility, HOPE leads to a net influx into better four-year colleges in terms of prior cohorts' graduation rates. Do these findings foretell higher economic returns for students affected by HOPE? The returns to a year of community college are very similar to the returns to a year of university education (Kane and Rouse, 1995), but four-year students typically enroll for a longer spell. Thus, economic returns to HOPE will depend on the extent to which the scholarship encourages student persistence and completion in both sectors. In other settings, conclusions for post-enrollment outcomes are mixed. West Virginia's PROMISE scholarship and Florida's Student Access Grants have been shown to increase bachelor's degree re-

ceipt (Scott-Clayton, 2011; Castleman and Long, 2012, respectively), but across states, merit aid has had little effect on degree completion (Fitzpatrick and Jones, 2012; Sjoquist and Winters, 2012).

Our main empirical strategy identifies the local impact of HOPE, and it may well be the case that high-performing students are induced to stay in the state because of HOPE, or that students with ACT scores much lower than the threshold would be more sensitive to HOPE scholarships than students at the threshold. We estimate treatment effects beyond the threshold, drawing on methods proposed by Angrist and Rokkanen (2012). Results indicate that the impact of HOPE on two-year and four-year matriculation is very local – substitution into four-year colleges does not generalize to higher ACT scores, although the potential impact on students below the threshold appears to be more meaningful.

The remainder of our paper is organized into four sections. The following section describes the HOPE scholarship and compares it to broad-based financial aid programs in other states. Section 3 describes the data and methodology. Section 4 analyzes recent cohorts of Tennessee high school graduates and presents findings regarding the effect of HOPE scholarships on matriculation decisions – i.e., whether to go out of state, attend a for-profit school, attend a HOPE-eligible school, and so forth. Section 5 offers conclusions.

## 2. The Tennessee Education Lottery Scholarship program (TELS)

The TELS program was initiated after a 2002 referendum approved the creation of a state lottery to fund postsecondary scholarships. Eligibility proposals were debated throughout the early part of 2003, and legislation was complete by May of that year. The first recipients of TELS scholarships were entering freshmen in the fall of 2004, as well as sophomores who met the post-enrollment conditions of a one-time grandfather clause.

The bulk of the TELS program funds the Tennessee HOPE Scholarship, which currently provides up to \$6000 per year to eligible full-time students attending four-year institutions (including all in-state public and private, non-profit colleges and universities) and up to \$3000 per year to students at in-state public two-year institutions without on-campus housing.<sup>1</sup> HOPE scholarships are meaningful reductions in the costs of attending college. The top panel of Table 1 lists the share of tuition and fees accounted for by basic HOPE grants (without considering supplements), by year. For the 2006–2007 academic year, HOPE scholarships accounted for 76 percent of in-state tuition and fees at public community colleges and four-year universities and 24 percent at private colleges. Over the following years, rising tuition and fees outpaced changes in the basic HOPE grant.<sup>2</sup> HOPE scholarships account for 14–16 percent of the total cost of attending a two-year college (including off-campus housing), versus as much as 23 percent for four-year colleges with on-campus housing and up to 14 percent for private colleges.

The HOPE scholarship is available to students with near-average high school grade point averages and ACT scores. HOPE winners must attain either a 21 on the ACT or an overall weighted

<sup>1</sup> While we do not consider them here, several additional TELS programs fund grants, supplements or loan forgiveness to particular groups of students. Together, these specialized grants and supplements account for 28 percent of all TELS awardees and 16 percent of expenditures (Bruce and Fox, 2010). The remainder is accounted for by HOPE-eligible students in two-year and four-year colleges and universities.

<sup>2</sup> In 2004–2005, the first year of the TELS program, the HOPE scholarship was \$3000 for students at four-year institutions and \$1500 for students at two-year institutions. These values were increased to \$3800 (\$1900) for 2006–2007, \$4000 (\$2000) for 2007–2008 and 2008–2009, and up to \$6000 (\$3000) per academic year for 2009–2010. The most recent increase is due to the provision that students can use \$2000 (\$1000) toward summer tuition and fees. In all years, grants are prorated for part-time students.

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