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ABSTRACT

Gaining, Losing, And Regaining Merit-Based Scholarships*

Georgia offers two merit-based scholarships to in-state college students: HOPE Scholarships, which provide partial tuition support, and Zell Miller Scholarships, which provide full tuition support but with more stringent eligibility and retention conditions. Studies have examined retention of these scholarships but not other dynamics, including gaining HOPE Scholarships if students enter without them and follow-on transitions after students initially lose or gain a scholarship. This study uses 2013-2019 administrative data from 26 University System of Georgia institutions to jointly estimate multivariate competing-risk hazard models of a) losing an entering Zell Miller Scholarship, b) losing an entering HOPE Scholarship, c) gaining a HOPE Scholarship after matriculating without one, d) regaining a scholarship, and e) losing a non-entering scholarship. Many students change their scholarship status—event-history analyses predict that 25 percent of entering Zell Miller Scholarship students lose their scholarships by their 90th credit hour, 42 percent of entering HOPE Scholarship students lose their scholarship by their 90th credit hour, and 27 percent of students who enter without a scholarship gain them. Students of color, students with economic disadvantages, and men are more likely to lose scholarships and less likely to gain scholarships. These dynamics compound inequities in initial scholarship receipt.

JEL Classification: I22

Keywords: merit-based scholarships, financial aid, administrative data, dynamics, equity

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INTRODUCTION AND MOTIVATION

State-funded merit-based scholarships are intended to help students with the cost of post-secondary education and to raise students' educational attainment. Twenty-five states offer some type of financial aid for college based on students' high school GPA, standardized test scores, or a combination of the two (Education Commission of the States, 2019). Georgia innovated these programs through the Helping Outstanding Pupils Educationally (HOPE) Scholarship program in 1993. After reducing HOPE Scholarships from full to partial tuition, the state added the full-tuition Zell Miller Scholarship in 2011. These programs are Georgia's primary means of providing direct financial aid for college, funding more than 100,000 students at public colleges and universities each year.[1] In 2017, only three states provided more state-funded financial aid per student than Georgia (National Science Board, 2019).

Because of the merit-based criteria, though, many students do not receive awards. Rates of receipt are lower among students of color and economically disadvantaged students (see, for example, Jones, 2020). Moreover, some students who initially receive scholarships subsequently lose them. Losses of scholarship support can create financial and other stresses that undermine student performance and possibly contribute to changing schools or dropping out. Students can also gain scholarships while in college or gain and lose scholarships multiple times.

Previous research on merit-based scholarships has largely examined the statewide effects of such programs (see, for example, Dynarski, 2000; Cornwell, Mustard and Sridhar, 2006; Singell, et al., 2006) or outcomes for individual students who initially receive scholarships (see, for example, Cornwell, et al. 2008; Sjoquist and Winters, 2015). Relatively little research has examined the more complex dynamics of scholarships losses and gains during students' college careers. In Georgia, these dynamics

[1] In fiscal year 2019, the state of Georgia awarded $398 million in HOPE Scholarships to 93,907 students at University System of Georgia and Technical College System of Georgia institutions and $218 million in Zell Miller Scholarships to 26,679 students at these institutions (Georgia Student Finance Commission, 2019).

are particularly complex because students can lose the full-tuition Zell Miller Scholarship and transition to either the partial-tuition HOPE Scholarship or to no scholarship.

This paper examines rates at which students in the 26 institutions within the University System of Georgia (USG) enter with and subsequently earn, lose, and regain HOPE and Zell Miller Scholarships. We use administrative data from the USG to conduct a comprehensive event-history analysis of changes in merit-based scholarship receipt over students' careers. Examining Georgia residents who entered USG institutions as freshmen in and after Fall 2013, we identify students who

- lose an entering Zell Miller Scholarship,
- lose an entering HOPE Scholarship,
- gain a HOPE Scholarship after matriculating without one,
- regain a Zell Miller or HOPE Scholarship, and
- lose a non-entering HOPE Scholarship.

This study is the first multivariate analysis of factors associated with the full set of scholarship dynamics, extending previous research on initial scholarship receipt and scholarship losses to include scholarship gains and follow-on spells of scholarship losses and gains. A more complete understanding of these outcomes is important because they affect many students. A high percentage of in-state students enter USG institutions with these scholarships, and the percentages increased from 60 percent of entering full-time freshmen in Fall 2013 to 65 percent in Fall 2019. Changes in scholarship status are also common. The USG (2020) calculates that fewer than half of recipients in its institutions keep their scholarships through graduation, that about an eighth who enter college without a HOPE Scholarship subsequently earn one, and that nearly a fifth of students who lose scholarships regain them at some point in their academic career.

Changes in scholarship status are individually consequential. The loss of a Zell Miller Scholarship can amount to more than $10,000 in annual support at a research university, and the loss of a HOPE

Scholarship can amount to more than $7,600 in annual support. These large, sudden, and possibly unexpected swings in students' resources would require them and their families to make fast adjustments to financial aid arrangements. The changes could lead to a cascade of events in which an initial decline in academic performance and scholarship loss leads to financial strains and other stresses that further reduce subsequent academic performance.

The analysis is also valuable from an equity perspective. While previous research points to substantial differences in *initial* merit scholarship receipt by race and economic status (see, for example, Jones, 2020; Rubenstein and Scafidi, 2002), less is known about whether *subsequent* patterns of scholarship loss and gains over students' college careers reduce or exacerbate these inequalities. This study focuses on how scholarship dynamics differ for students of color and students who are economically vulnerable, especially students who receive Pell grants, are financially independent, or are from families with lower incomes, and provides a more complete picture of the distribution of scholarship outcomes.

In addition to student characteristics, we explore how institutional factors are related to scholarship dynamics, such as differences in scholarship retention and loss rates across institutions and over time, as several eligibility and retention rules changed in the later years of our sample. By more fully understanding student and institutional factors related to merit scholarship dynamics, state and university policymakers can pursue more effective policies to identify and support students at risk of losing their scholarships and reduce inequalities in degree attainment.

The remainder of the paper is in several sections. The next section provides background on the HOPE and Zell Miller Scholarship programs and reviews what we know from previous studies. The subsequent section describes the data that we use for our analyses. The following section reports results from descriptive, cross-tabulation analyses of scholarship dynamics across the USG and from multivariate, event-history models. The final section presents conclusions and implications for policy.

BACKGROUND

GEORGIA'S MERIT-BASED SCHOLARSHIP PROGRAMS

Georgia's HOPE Scholarship program began in 1993, offering resident students who earned a high school GPA of 3.0 or higher funding for full tuition, fees, and a book allowance at any public university in Georgia or a smaller flat grant if they attended a private institution in Georgia. The program initially had an income cap for eligibility and reduced scholarship awards for students with Pell grants, but these features were subsequently removed. Since those changes, the program has been entirely merit based.

To retain their HOPE Scholarships, students must maintain a 3.0 cumulative "HOPE college GPA," with checkpoints at the end of most students' spring terms and after attempting 30, 60, and 90 semester credit hours.[2] Students whose HOPE college GPAs fall below a 3.0 at the checkpoints lose their full scholarship. While students initially could earn the scholarship only out of high school, the program now allows students who enter college without a scholarship to earn one if their cumulative HOPE college GPA rises above 3.0 at a 30th, 60th, or 90th semester-hour checkpoint. It also allows students to regain scholarships at these checkpoints.

Changes were made in 2011 to ensure the long-term sustainability of the program. The state created a new Zell Miller Scholarship, which covered full tuition at public universities, and reduced the amount of the HOPE Scholarship to cover only a portion of tuition (initially approximately 86 percent of tuition for a student taking a full-time course load at a research university). Both programs eliminated coverage for fees and books. The 3.0 GPA requirements for initial eligibility and scholarship retention were retained for the HOPE Scholarship, but the Zell Miller Scholarship introduced more stringent requirements. For initial eligibility, Zell Miller Scholarship students must have a high school GPA of 3.7 or

[2] The HOPE GPA is based on all the student's attempted hours after completing high school graduation, including transferred hours, remedial course hours, and withdrawals.

higher and a minimum ACT composite score of 26 or SAT total score of 1200. They cannot later earn the scholarship if they do not meet these initial criteria. To retain the Zell Miller Scholarship, students must maintain a minimum 3.3 college GPA. If their college GPAs fall between 3.3 and 3.0, they transition to a HOPE Scholarship, and if their GPAs fall below 3.0, they fully lose their scholarships. Students can regain a Zell Miller Scholarship if their cumulative GPA reaches 3.3 at a later checkpoint.

There have been two other recent program changes. First, starting with the high school graduating class of 2015, students were required to complete more rigorous high school courses to earn the scholarships. Graduates in the class of 2015 were required to earn at least two credits from a menu of advanced courses, with the requirement increasing to three credits for 2016 graduates and four credits thereafter. Second, recognizing that the scholarships' retention criteria could create incentives for scholarship holders to alter class selections or change majors to maintain their GPAs, the state modified the scholarship GPA formula to boost the points awarded to designated science, technology, engineering, and math (STEM) courses by 0.5 points, starting in Fall 2017.

PREVIOUS STUDIES

By linking financial aid to academic performance, merit scholarships provide students with a tangible incentive for high levels of achievement in both high school and college. Merit aid may increase college enrollment by improving academic preparation, reducing costs, and reducing uncertainty about how to pay for college. Because students must remain in state to receive merit-based scholarships, the awards may also increase the number of college graduates within the state and stem "brain drain" to other states (Sjoquist & Winters, 2014). The retention criteria—and the opportunity to gain or regain scholarships—should motivate performance during college.

Much of the research on the effects of merit-based scholarships has considered merit aid's effects on initial college enrollment (e.g., Castleman, 2014; Cornwell et al., 2006; Dynarski, 2000; Farrell & Kienzl, 2009; Singell et al., 2006). Other research has examined effects on persistence and college

degree attainment (Dynarski, 2008; Henry et al, 2004; Scott-Clayton, 2011; Sjoquist & Winters, 2015). The research findings on the programs' effects have been mixed. For example, Dynarski (2000) found that Georgia's HOPE Scholarship increased college attendance, with larger effects among White students and students from middle- and upper-income families. In contrast, Cornwell et al. (2006) found that Georgia's HOPE program led to larger enrollment increases for Black students than for White students. Similarly, Dynarski (2008) found that merit-based scholarships in Georgia and Arkansas increased the share of young residents with college degrees, primarily among Black and Hispanic women, while Sjoquist and Winters (2015) found no significant effects of merit aid on college completion. Castleman (2014) reported that partial-tuition merit scholarships in Florida had little effect on college persistence or graduation, while full-tuition scholarships had large positive effects. A meta-analysis of 43 studies on financial aid concluded that, overall, merit-based aid does not increase college persistence or graduation, though the authors could not analyze differential effects by sex or by race and ethnicity (Nguyen et al., 2019).

Many studies have used state-level data or surveys that cannot distinguish scholarship recipients from non-recipients and therefore, cannot identify which students lose or gain scholarships during college. The relationship between entering merit aid awards and college persistence and graduation is likely reduced if relatively few students retain a scholarship throughout their college careers. For example, Henry et al. (2004) examined Georgia students who were just above and just below the entering HOPE Scholarship eligibility thresholds and found higher college GPAs, credit accumulation, and graduation rates for HOPE recipients. However, the advantage was isolated to the very small share of students in their study who kept their scholarships throughout college. Carruthers and Ozek (2016) used a similar strategy to study Tennessee's HOPE Scholarship program and found that students just below the threshold for keeping their scholarships accumulated fewer credits, were more likely to work, and more likely to leave college. The effects were strongest for students with annual family incomes below

$60,000. Jones et al. (2020) examined effects on students who lost some of their financial aid when HOPE Scholarships shifted from full to partial tuition in 2011 and found no effect on persistence or graduation from college. This may be because the scholarship loss is partial and, for these high-achieving students who are already partway through their college careers, the invested time and likelihood of success outweigh the increased out-of-pocket costs. Dee and Jackson (1999) found higher scholarship retention among women but no differences by race or ethnicity once they controlled for SAT scores and high school GPA.[3] They also found lower retention rates for students in STEM majors. Beyond this, there has been relatively little research on the characteristics of students that are associated with scholarship retention.

Given the limited evidence on scholarship loss and the absence of research on scholarship gains during college, it is important to more fully understand these transitions and whether some students are more likely to experience them. The USG produces a longitudinal descriptive report each year tracking scholarship receipt and retention across the university system and by institution, following each student for six years after entry into the system. Of the 24,496 students who entered a USG institution with a HOPE or Zell Miller Scholarship in Fall 2013, just under half continuously kept scholarships and graduated within six years. Approximately 17 percent of scholarship recipients lost their scholarships by the 30th credit-hour checkpoint. Of those who retained their scholarships, 20 percent lost the scholarship by the 60th credit-hour checkpoint. Almost 17 percent of students who lost scholarships after 30 credits regained one at a later checkpoint. Among the students who entered USG institutions without a HOPE or Zell Miller Scholarship in Fall 2013, 12 percent later gained a scholarship.

This paper builds on previous research to fill gaps in our understanding of the dynamics of scholarship gains and losses. It is the first multivariate study to examine characteristics of students who

[3] Carruthers and Ozek (2016) provided descriptive evidence from Tennessee that men, Black students, and students from low-income families were more likely to be just below the scholarship retention threshold than just above it; however, they did not conduct a multivariate analysis to control for other characteristics.

transition *into* merit-based scholarships—specifically, students who gain a HOPE Scholarship after matriculating without one and regain a merit-based scholarship after losing one. The analysis of gains has implications for equity because higher proportions of Black and Hispanic students and students from economically disadvantaged backgrounds enter college without this assistance as compared to White and more affluent students. The study also conducts the first multivariate analysis of follow-on spells of scholarship holding, allowing us to examine how the dynamics of non-entering scholarship spells differ from entering scholarship spells.

DATA

We analyze students' scholarship receipt using administrative records from USG institutions for academic year (AY) 2013-14 through AY 2018-19. In addition to scholarship receipt, the records describe students' enrollments, credit hours, demographic characteristics, high school credentials, and financial aid information. The administrative records for each student are organized sequentially on a term-by-term basis. We select sequences of records for in-state students who enrolled in bachelor's degree programs as first-time freshmen between the fall term of 2013 and the spring term of 2018. The sequences start at enrollment. Our analyses omit out-of-state students who would not have been eligible to receive a Zell Miller or HOPE Scholarship. They also omit students who enrolled in associate degree, diploma, or certificate programs or on a non-degree basis, as scholarship receipt is much lower for these students and schooling progressions are different. We do not consider students who enrolled before Fall 2013 because we cannot observe their initial scholarship histories. Similarly, we exclude students who enrolled after Spring 2018 because almost no students who enrolled after this date were observed past their 30th credit hour where we measure their first possible scholarship transitions.

With these selection criteria, we observe the beginnings of all scholarship sequences. However, we are not able to observe all students through their 90th credit-hour check-in. Sequences can be incomplete for several reasons. First, they will be incomplete if students are enrolled past the end of our

available data in Spring 2019. Second, the administrative records only cover students who attend USG institutions, and sequences will be incomplete if students stop attending a USG institution and do not re-enroll at that or another USG institution. Third, we stop following students whose enrollment breaks are longer than one year—a time period often used to distinguish students who drop out of college from those who "stop out" for a short period (Stratton et al., 2008)—or if their records are missing information on credit hours and we cannot determine whether they have reached a check-in. Fourth, we stop following students if they enroll in multiple institutions simultaneously or transfer from one USG institution to another. We make this final restriction because the administrative information on credit hours is only consistent within institutions and not across institutions. Our multivariate analyses use event-history methods that account for incomplete spells.

ANALYSIS PERIOD AND SPELLS

We organize the term-by-term sequences for each student into four periods that align with the credit-hour thresholds when HOPE or Zell Miller Scholarship eligibility is checked or re-established. The first period begins with the student's first term of enrollment at a USG institution. The subsequent periods begin in the first terms after the student's attempted semester credit hours exceed either 30, 60, or 90.[4] Within each period, we create mutually exclusive indicators for whether the student

- received a Zell Miller Scholarship at any time during the period,
- received a HOPE Scholarship at any time during the period but did not receive a Zell Miller Scholarship, or
- did not receive either scholarship during the period.

We further organize the data into spells of scholarship receipt or non-receipt. Given how we organize the

[4] Students can lose scholarship eligibility within these intervals. As mentioned, eligibility for most full-time scholarship holders is checked at the end of the spring semester. Students can also lose eligibility if they fail to make adequate academic progress at their institutions or fail to meet other requirements. Our calculation of attempted credit hours excludes hours attempted during high school, such as dual-enrollment hours and Advanced Placement credits.

data, each student can transition up to three times and have up to three spells.[5]

We examine three types of first, or entering, spells:

- spells of entering Zell Miller Scholarship receipt with possible transitions to HOPE Scholarship receipt or no scholarship receipt,
- spells of entering HOPE Scholarship receipt with possible transitions to no scholarship receipt, and
- spells of entering non-scholarship receipt with possible transitions to HOPE scholarship receipt.

We also consider two types of subsequent, or non-entering, spells:

- spells of non-entering scholarship receipt for which we consider transitions to no scholarship receipt, and
- spells of non-entering non-scholarship receipt for which we consider transitions to scholarship receipt.

For both types of subsequent spells, it is possible for students to receive or transition to receiving a Zell Miller Scholarship if they held this type of scholarship in their first spell. However, because very few students experience these transitions, we only consider the composite outcome of holding either a HOPE or Zell Miller Scholarship.

OTHER MEASURES

For each spell in our data set, we measure the duration of how many periods the student continues in the same scholarship status, and for the spells with observed transitions, we record the type of transition a student makes. Other characteristics that we can measure from the administrative data include the student's gender; race and ethnicity; high school GPA; ACT composite score or its equivalent based on the SAT; household adjusted gross income (AGI), normalized to 2019 dollars using the

[5] If we were to consider terms of scholarship receipt instead of check-in periods, we would observe more transitions and spells. We also exclude spells that begin after students' 90th credit hour.

Consumer Price Index for Urban Consumers; receipt of Pell grants or student loans; whether a student reports being independent of their parents for financial aid purposes; whether they enter in the fall, spring, or summer term; year of entry; and institution.[6] For the time-varying variables, we use the values from the first term within a check-in period. Information is missing for some variables. If students are missing information for their high school GPA, ACT score, or AGI, we assign a value of zero to the relevant measure, and we include an indicator for whether the information for that variable is missing. Appendix A provides more information about the construction of measures.

FINDINGS

CHARACTERISTICS OF ENTERING FIRST-TIME FRESHMEN

We begin by describing the characteristics of students when they enter USG institutions. Table 1 lists the number of students with a given characteristic (column 1) and the percentages of those students who entered with a Zell Miller Scholarship (column 2), a HOPE Scholarship (column 3), or neither scholarship (column 4).

[Table 1 about here.]

Of 175,519 first-time freshmen Georgia residents entering the university system from Fall 2013 through Spring 2018, just over half enter with a HOPE Scholarship; about one-sixth enter with Zell Miller awards, and just under one-third enter without one of the scholarships. Scholarship receipt, especially for the Zell Miller award, differs markedly across racial and ethnic groups. White students are over six times more likely than Black students to enter with a Zell Miller Scholarship, and Asian students are nearly eight times more likely. Differences in HOPE Scholarship receipt are less pronounced, with White students receiving HOPE at the highest rate and Black students at the lowest rate. Only 21 percent of

[6] Students can take either the ACT or SAT for admission and to qualify for the Zell Miller Scholarship. To simplify the analysis, we convert SAT test scores into ACT equivalents and use a single ACT test score measure. Also, information for students' AGIs and financial independence status is only available if they completed the Free Application for Federal Student Aid (FAFSA).

White and Asian students enter without merit-based aid, while Black students are more than twice as likely to do so.

The figures reveal other differences. Women are much more likely than men to enter with Zell Miller or HOPE Scholarships. Scholarship receipt increases with students' high school GPAs, ACT test scores, and AGIs. Scholarship receipt is lower for students who receive Pell grants, take out student loans, and declare themselves independent of parents for financial aid purposes. Examining the scholarship figures by year of entry, we see that overall scholarship receipt has grown, driven by increases in Zell Miller Scholarship receipt. Scholarship receipt is highest among students who enter the USG system in the fall term (the vast majority of students) and much lower among those who enter in the spring.

Finally, we examine scholarship receipt by type of institution, using the USG designations of research universities, comprehensive universities, state universities, and state colleges. The research universities are generally the most selective, and consistent with this, merit aid receipt is highest at these schools. Eighty-nine percent of students at research universities enter with some form of merit aid, with 40 percent receiving Zell Miller Scholarships. By contrast, less than one third of students at state colleges enter with either scholarship, and only 1.8 percent have a Zell Miller Scholarship.

TRANSITIONS AND SPELL DURATIONS

Students' scholarship status can change in many ways. To describe the frequency of changes and how these vary across each type of scholarship spell, we calculate Kaplan-Meier hazard probabilities for transitions out of spells at each possible spell duration. We also use the hazard figures to calculate cumulative probabilities of experiencing different types of exits and survivor functions of continuing each spell. The hazard and cumulative probability calculations account for some spells not being observed to a transition or past the 90th credit hour. The figures are reported in Table 2.

[Table 2 about here.]

The top panel in Table 2 lists the hazard and cumulative transition probabilities for students who enter bachelor's degree programs at USG institutions with Zell Miller Scholarships. The hazard calculations indicate that students have low period-by-period probabilities of losing these scholarships. The probability of transitioning to a HOPE scholarship at the first check-in is 9.4 percent, and the probability of transitioning to no scholarship is 6.7 percent. The hazard rates for transitioning to a HOPE Scholarship are higher than the hazard rates for transitioning to no scholarship at all durations, and both hazard rates fall as spells progress (exhibit negative duration dependence). The decreasing rates of scholarship losses may occur for several reasons, including positive scholarship retention outcomes motivating students to achieve academically, higher-achieving students being more likely to be retained in the data, and cumulative GPAs becoming less changeable as credit hours increase. The survivor rate calculations indicate that just over a quarter of entering Zell Miller Scholarship students would lose those scholarships if they continue past their 90th credit hour at their initial institution.

The second panel in Table 2 reports the hazard and cumulative probabilities of losing entering HOPE Scholarships. The rates of scholarship loss among entering HOPE Scholarship students are much higher than the rates among entering Zell Miller Scholarship students. Thirty percent of entering HOPE Scholarship students are calculated to lose their scholarships by the 30th credit-hour check-in. The hazard probabilities fall thereafter with the spell duration. By their 90th credit-hour check-in, 42.0 percent of entering HOPE Scholarship students are calculated to experience a scholarship loss.

The third panel shows outcomes for students who entered with neither Zell Miller nor HOPE Scholarships and indicates a moderate rate of scholarship gain. At their first check-in, 30.0 percent of students without one of Georgia's merit-based scholarships and who continue to be observed in the data gain a HOPE Scholarship. Hazard rates diminish as non-scholarship spells progress. Cumulatively, 27.4 of entering non-scholarship students are calculated to gain a HOPE Scholarship if they continue at their initial institution past their 90th credit hour.

The bottom two panels show the transition patterns for follow-on (non-entering) spells. Because students can only experience these spells if they transitioned out of an entering spell, their spells can be no longer than three periods. The fourth panel reports the hazard and cumulative probabilities for spells of non-entering scholarship receipt. Rates of non-entering scholarship loss are moderately high, with hazard rates of 18.0 percent after the first interval (which would occur at the 60th or 90th credit-hour check-in period) and 9.7 percent in the second interval (which would occur at the 90th credit-hour check-in). The fifth (bottom-most) panel reports hazard rates and cumulative probabilities for spells of non-entering, non-scholarship receipt. The hazard probabilities for these spells are also moderately high and fall with spell duration.

For all types of spells, the figures in Table 2 indicate that although many students change their scholarship status, most continue in a given spell status. The figures also indicate that all five spells exhibit negative duration dependence, meaning the transitions become less likely as spells progress.

MULTIVARIATE MODEL SPECIFICATION

To examine how different characteristics are associated with students' scholarship dynamics, we estimate a system of multivariate event-history models that can account for confounding influences from other observed characteristics, for scholarship status spells being incomplete, and for unobserved characteristics that can affect spell durations and lead to correlations among the spells. For each type of scholarship status spell, *m* (=1, 5), we specify discrete-time hazard models of transitioning to outcome *j* at duration *d* with the following multivariate specification:

$$h_{m,j}(d) = \frac{\exp\left(\boldsymbol{\alpha}'_{m,j}\boldsymbol{D}_d + \boldsymbol{\beta}'_{m,j}\boldsymbol{X}_d + \lambda_{m,j}\mu\right)}{\sum_{k=1}^{K}\exp\left(\boldsymbol{\alpha}'_{m,k}\boldsymbol{D}_d + \boldsymbol{\beta}'_{m,k}\boldsymbol{X}_d + \lambda_{m,k}\mu\right)}, \quad (1)$$

where $h_{mj}(d)$ is the hazard probability for a given type of spell and outcome, $\boldsymbol{D}_d$ is a set of duration indicators, $\boldsymbol{X}_d$ is a set of observed and possibly time-varying characteristics, μ is a normally distributed random variable, and $\boldsymbol{\alpha}_{m,j}$, $\boldsymbol{\beta}_{m,j}$, and $\lambda_{m,j}$ are sets of coefficients to be estimated. For entering Zell Miller

Scholarship spells, the number of possible outcomes, *K*, is three, and for all other spells, the number of possible outcomes is two. To normalize the model, we use *j* = 1 for the continuation outcome and set all the coefficients in $\boldsymbol{\alpha}_{m,1}$, $\boldsymbol{\beta}_{m,1}$, and $\lambda_{m,1}$ to zero.

We augment the system of scholarship dynamics models to address two other issues. First, to account for the student's entering scholarship status not being exogenously assigned, our system includes an initial-conditions multinomial logit specification of entering scholarship status, S_0, being *s* (= 1, 3),

$$\text{Prob}(S_0 = s) = \frac{\exp\left(\boldsymbol{\delta}_s' \boldsymbol{X}_d + \lambda_{0,s}\mu\right)}{\sum_{k=1}^{K} \exp\left(\boldsymbol{\delta}_k' \boldsymbol{X}_d + \lambda_{0,k}\mu\right)}, \tag{2}$$

where $\boldsymbol{\delta}_s$ and $\lambda_{0,j}$ are sets of coefficients to be estimated. The specification accounts for the possible correlation between the unobserved determinants of entering scholarship status and subsequent scholarship dynamics through the inclusion of a shared person-specific unobserved term, μ, and the parameters (loading terms), $\lambda_{0,j}$.

Second, there may be selective attrition among students whose scholarship status spells are incomplete because they transferred from their initial institution, dropped out, or enrolled in multiple institutions. We create a time-varying indicator for the student's sequence of data being censored for any of those reasons (we continue to consider sequences that are censored because they reached the end of our observation window or because of incomplete explanatory variables as being randomly censored). Our system includes a discrete-time hazard model of the form

$$h_A(d) = \frac{\exp(\boldsymbol{\alpha}_A' \boldsymbol{D}_d + \boldsymbol{\beta}_A' \boldsymbol{X}_d + \lambda_A \mu)}{1 + \exp(\boldsymbol{\alpha}_A' \boldsymbol{D}_d + \boldsymbol{\beta}_A' \boldsymbol{X}_d + \lambda_A \mu)}, \tag{3}$$

where $h_{Aj}(d)$ is the hazard probability for selective attrition and $\boldsymbol{\alpha}_A$, $\boldsymbol{\beta}_A$, and λ_A are sets of coefficients to be estimated. As with the initial conditions model, the shared person-specific unobserved term, μ, and loading term, λ_A, allows for a correlation between the unobserved determinants of attrition and the other processes in our system of models.

We use the generalized structural equations modeling (gsem) package in Stata to jointly estimate versions of the hazard equation (1) for each of the five types of spells a student may experience, the initial conditions model (2), and the selective attrition hazard model (3). For all five scholarship spell specifications and the attrition model, we include observed controls for the student's demographic characteristics, high school GPA, ACT composite score, personal or family AGI, Pell grant and student loan receipt, financial independence, entry term, entry school year, institution or institution type, and high school GPA, ACT, or AGI being missing.[7] For the two non-entering spell specifications, we include additional controls for the check-in period when the observation occurs. For the attrition model, we include additional controls for the student's entering scholarship status. For the initial conditions model, we include controls for most of the observed characteristics from the other models but omit controls for student loans, term of entry, and institution, as these may be chosen conditional on scholarship status.

MULTIVARIATE FINDINGS

Table 3 displays estimates of selected coefficients and standard errors from the multivariate event-history models for scholarship spells (first six columns), the sample continuation model (seventh column), and the initial scholarship status model (last two columns). In addition to the listed explanatory variables, the models include indicators for the ACT score, AGI, or declared financial status being missing; a general set of dummy variables for the year of entry into a USG institution; and indicators for each research, comprehensive, or state university. Detailed results for these controls are available upon request. The magnitudes of coefficients do not have straightforward interpretations because of the nonlinear specifications of the models and because the outcomes for the event-history models are conditional (hazard) probabilities. Therefore, we focus on the sign of the coefficient, statistical significance, and magnitude relative to other coefficients.

[7] Because of the modest enrollments and low rates of Zell Miller Scholarship receipt at the state colleges, we group these institutions together into a single category and make it the reference category.

[Table 3 about here.]

The first two rows show how passing the second check-in point or third check-in point during a scholarship or non-scholarship spell is related to the likelihood of experiencing a transition; the associations are expressed relative to passing the first check-in point in the spell. Consistent with the descriptive results in Table 2, the multivariate estimates indicate that students are less likely to change their scholarship status the longer they continue in a spell.

Examining transitions to no scholarship or to a HOPE Scholarship for students who enter college with a Zell Miller Scholarship (first two columns of results), we see several significant relationships. Black students are more likely to transition from Zell Miller Scholarships to no scholarship or a HOPE Scholarship. Women, students with higher high school GPAs, and students with higher ACT scores are less likely to experience these transitions. Holding a student loan and reporting to be financially independent on the FAFSA are associated with higher likelihoods of transitioning to no scholarship or a HOPE Scholarship, with particularly large effects for financial independence. Receiving a Pell grant is also associated with a higher chance of transitioning to no scholarship. Entering college in the summer is associated with a higher likelihood of losing a Zell Miller Scholarship or transitioning to HOPE.[8] In addition, the risks of losing a Zell Miller Scholarship are lower for later entry cohorts, though these results are not shown in the table.

Table 3 also displays coefficients for Georgia's three large public research universities. Students who attend the state's selective engineering-focused public institution, the Georgia Institute of Technology (Georgia Tech), have substantively higher risks of transitioning into HOPE and no scholarship status, relative to students at other institutions. Students who attend the state's flagship university, the University of Georgia, also have relatively high rates of transitioning from Zell Miller to HOPE

[8] There are few observable differences, on average, between USG students who enter in the summer and fall. Students who enter in the summer are more likely to attend research universities and less likely to have Pell Grants or student loans in their entry terms.

Scholarships, though the rates are lower than for Georgia Tech. Conversely, students who attend the state's largest and most diverse research institution, Georgia State University, have a significantly lower likelihood of transitioning from a Zell Miller Scholarship to no scholarship, compared to other institutions.

We see similar patterns when we examine losses of entering HOPE Scholarships (third column). Black students are more likely to lose entering HOPE Scholarships, and women, older students, students with higher high school GPAs, and students with higher ACT scores are less likely to lose them. Lower adjusted gross income, Pell grant receipt, student loan borrowing, and financial independence are all associated with higher likelihoods of losing an entering HOPE Scholarship, as is entering in the summer. Students at Georgia Tech and the University of Georgia have higher likelihoods of losing entering HOPE scholarships as compared to other institutions, with a particularly strong relationship for students at Georgia Tech. As in the Zell Miller Scholarship results, students at Georgia State University have significantly lower rates of transitioning from a HOPE Scholarship to no scholarship as do students who entered in later years of our analysis period.

We also examine factors related to gaining a HOPE Scholarship among students who enter without one (fourth column). Black and Hispanic students, men, and older students are less likely to gain a scholarship, while students with higher high school GPAs and higher ACT scores are more likely to gain one. Household income is positively associated with the likelihood of gaining a scholarship. Among the other financial measures, receiving loans and a FAFSA declaration of financial independence have significant negative relationships with gaining a scholarship. Entering in the spring term is negatively related to scholarship gain. Students attending Georgia Tech have a lower likelihood of gaining a HOPE Scholarship, while students attending Georgia State University have a higher likelihood.

We also investigate spells that began after students first enrolled in college. In the fifth column of Table 3, we examine losses of non-entering scholarships, and in the sixth column, we examine returns

into scholarship status among students who previously lost a scholarship. The patterns for losing non-entering scholarships are similar to those for losing entering scholarships, though slightly weaker. Black students and men are more likely to lose a scholarship they gained while in college, as are students with lower high school GPAs. Unlike previous analyses, ACT scores are not significantly related to non-entering scholarship loss. Of the financial indicators, only students who are financially independent have a significantly higher likelihood of losing a scholarship they gained while in college. Students who enter in the summer term are also more likely to lose non-entering scholarships. The estimates also indicate students at Georgia State and the University of Georgia are less likely to lose scholarships they gained in college.

Examining students who regain scholarships after losing them, Black students, Hispanic students, and men are less likely to experience these transitions. Higher high school GPA and ACT scores are associated with a higher likelihood of regaining a scholarship. Receiving Pell grants, taking out student loans, and entering in the summer term are associated with lower probabilities of transitioning to a scholarship after losing one.

Prior to conducting our analyses, we searched institution websites and contacted institutions for campus-based programs specifically designed to help students keep their merit-based scholarships. We found two programs: "Keep HOPE Alive" at Georgia State University and "Thrive" at Kennesaw State University.[9] The Georgia State University program identifies freshman and sophomore students with GPAs just below 3.0 and invites them to participate. Students must enroll for at least 30 credits in the next academic year and agree to participate in activities such as academic coaching, student success workshops, and student advisement sessions. In return, they receive $1,000 upon successful completion

[9] Institutions may also have broader student success efforts aimed at helping students keep financial aid and promote success in general. For example, the systemwide African-American Males Initiative seeks to increase the number of Black men enrolling in, and graduating from, USG institutions by providing academic skills enrichment, support services and leadership training. Because this program operates across campuses and began before the years of our analysis, we cannot evaluate its effects on scholarship gains and losses.

of the program. Kennesaw State University's program enrolls incoming freshmen HOPE recipients who receive coaching, peer assistance, and optional participation in special programs and a freshman learning community designed to help students retain their scholarships. As noted, students at Georgia State University have lower rates of losing HOPE and Zell Miller Scholarships and higher rates of regaining scholarships. However, we do not find associations for these outcomes among students at Kennesaw State University (not shown). Students at Georgia State University and Kennesaw State University also have higher rates of gaining non-entering HOPE Scholarships, though to the best of our knowledge, the programs at these universities do not provide support to students who start without scholarships.

In column 7 we examine factors related to attritting from the sample during the time frame we examine. Students might leave the sample for a variety of reasons, including transferring within the USG, transferring to an out-of-state or private institution, or dropping out of college entirely. Therefore, we cannot draw conclusions about specific reasons students attrit. Black students, Hispanic students, Asian students, women, students with higher high school GPAs, and students with higher family incomes are all less likely to leave the sample. Students who receive Pell grants, who declare themselves financially independent, and who enter in the summer are each more likely to leave. Students attending state colleges are more likely to leave the sample than students attending other types of institutions.

The final two columns examine factors related to initial scholarship status. As with the descriptive results, Black and Hispanic students are less likely than White students to start college with either merit scholarship. Asian students are less likely to start with a HOPE Scholarship in both the descriptive and multivariate results, but the multivariate results also show they are less likely to begin with a Zell Miller Scholarship, in contrast to the descriptive results. While the reasons for this difference are not entirely clear, it could be due, in part, to Asian students having higher average high school GPAs and ACT scores, which are controlled in the multivariate results. Other results are similar to Table 1, with

women, students with higher GPAs, students with higher family incomes, those not receiving Pell grants, and those not financially independent being more likely to start with either scholarship. Students in later year are less likely to begin with a HOPE Scholarship but more likely to begin with a Zell Miller Scholarship.

ALTERNATIVE SPECIFICATIONS

To test how robust these results are to one of our specification assumptions, we re-estimate the event history models without controls for unobserved heterogeneity and report results in Appendix Table B1. While the coefficients are generally somewhat smaller in this alternative model due to a scaling factor, the signs and significance of the coefficients are virtually identical to those in the model with the controls.

Because of the substantial differences in scholarship dynamics between women and men, we re-estimate our models separately by gender (Appendix Tables B2 and B3). The estimates indicate that every type of scholarship spell exhibits negative duration dependence for men but only *entering* scholarship spells have this characteristic for women. An even stronger gender pattern appears for Asian students. Among men, Asian students are estimated have significantly lower risks than other students of losing entering HOPE scholarships and higher risks of gaining HOPE scholarships. However, among women, Asian students have significantly *higher risks* of losing Zell Miller and HOPE Scholarships and lower risks of regaining scholarships. Hispanic ethnicity has no significant associations with scholarship dynamics for men but is significantly negatively related to gaining and regaining scholarships for women. The models similarly indicate that declaring oneself to be financially independent has few significant associations with men's scholarship outcomes but is strongly positively associated with women's losses of entering and non-entering scholarships and negatively associated with women gaining a scholarship.

While the previous analyses examined factors associated with scholarship losses and gains across the institutions, it is possible that different relationships exist within types of institutions. For

example, while Pell grant recipients may be more likely to lose scholarships overall, they may not be more likely to lose them at certain types of institutions. To examine this issue, we conduct event-history analyses at each type of institution (research university, comprehensive university, state university and state college).

Estimates for the state's research universities (Appendix Table B4) are similar to the results for USG institutions as a whole. The principal differences are that that Pell grant receipt and a FAFSA declaration of financial independence have few significant associations with scholarship transitions. Estimates for the state's comprehensive universities (Appendix Table B5) are also mostly similar to the results for the general set of institutions, with the exception of the results for summer entry among Zell Miller Scholarship students. Estimates for the comprehensive universities indicate that these students are at less, rather than more, risk of losing scholarships, though the coefficients are imprecisely estimated.

In the analyses of the state universities (Appendix Table B6), we find fewer significant associations than in our general analyses. Black students are estimated to have significantly higher risks of losing entering HOPE scholarships and non-entering scholarships than other students and have significantly lower risks of regaining scholarships. However, none of the of the coefficients for race or ethnicity, including the coefficients for Black Zell Miller Scholarship students are significant at the state universities. We also find fewer significant associations for student loan borrowing and no significant associations for summer entry at these institutions.

The state colleges (Appendix Table B7) show several different patterns from the systemwide results. Relatively few students enter state colleges with Zell Miller Scholarships. Because of the modest number of Zell Miller Scholarship spells (292), almost none of the coefficients in the model for Zell Miller Scholarship transitions is statistically significant. At the state colleges, Hispanic and Asian students, women, students with better high school GPAs, and students with higher test scores are significantly less

likely to lose entering HOPE Scholarships, while students who take out loans are more likely to lose them. Black students and older students are less likely to gain non-entering HOPE Scholarships, and women, students with better high school GPAs, and students with higher test scores are more likely to gain them. Age (positive) and high school GPA (negative) are the only characteristics that are significantly associated with losing a non-entering scholarship, and being a woman (positive), high school GPA (positive), and student loan borrowing (negative) are the only characteristics that are significantly associated with regaining a scholarship.

CONCLUSION AND POLICY RECOMMENDATIONS

This paper analyzes changes in the receipt of merit-based HOPE and Zell Miller Scholarships over Georgia-resident students' college careers using administrative records for students who enrolled as first-time-freshmen in bachelor's degree programs at USG institutions between Fall 2013 and Spring 2018. It examines rates at which students lose Zell Miller and HOPE Scholarships that they held at enrollment, gain HOPE Scholarships after enrolling without one, regain scholarships, and lose non-entering scholarships.

We find that students' scholarship status changes frequently. The simple event-history analyses predict that 25 percent of entering Zell Miller Scholarship students lose their scholarships by their 90th credit hour, that 42 percent of entering HOPE Scholarship students lose scholarship by their 90th credit hour, and that 27 percent of students who enter without a scholarship gain them.

Rates of initial merit-based scholarship receipt differ by student race and ethnicity. White students are more likely than Black and Hispanic students to enter a USG institution with a HOPE Scholarship and, particularly, with a Zell Miller Scholarship. These disparities widen over students' careers as Black and Hispanic students are more likely than other students to lose scholarships and less likely to gain or regain them. Disparities in scholarship outcomes leave some groups of students with fewer resources to pay for college. As student success contributes to better lifetime economic

opportunities, wealth, family functioning, and other well-being outcomes, the disparities may slow progress toward closing other gaps.

The data also reveal differences in initial scholarship receipt and in changes in scholarship holding by gender, financial circumstances, and receipt of financial aid. Men, students from families with lower incomes, independent students, Pell grant recipients, and student loan recipients are less likely to enter institutions with Zell Miller or HOPE Scholarships, less likely to retain scholarships if they do hold them, and less likely to gain scholarships. These results indicate that the initial disparities in scholarship holding by gender, financial circumstances, and financial aid status widen as students progress through college.

The dynamics differ across institutions. Students at the Georgia Institute of Technology are more likely to lose scholarships and less likely to gain them than are students at other institutions. Students at the University of Georgia also have high rates of scholarship loss. In contrast, students at Georgia State University—one of the two institutions we were able to identify with formal programs to help students regain or retain scholarships—are less likely to lose scholarships and more likely to gain them. Differences in scholarship loss and gain that we observe for the USG in aggregate are also evident within types of institutions. Within types of institutions, Black students, men, and financially vulnerable students are generally more likely to lose scholarships and less likely to gain them, as compared to other students at the same institutions.

It is important to note that these analyses are descriptive rather than causal. With the available data, we cannot identify the exact reasons that some students are less likely to receive, lose, or gain scholarships. Nevertheless, the analyses highlight several potential policy implications and areas for additional research.

Scholarship students, especially those at high risk of losing scholarships, may benefit from broadening institutions' existing academic support and student success initiatives. These services

frequently target students who are at risk of not meeting satisfactory academic progress requirements but not scholarship students or students with moderately high GPAs who might have a good chance of gaining a scholarship. Scholarship students might also benefit from advising that addresses the unique rules and conditions of their scholarships, such as the potential effects of dropping courses. Similarly, non-scholarship students might benefit from advising that addresses how they might obtain scholarships.

Given the considerable sizes of the scholarships, there is likely to be an immediate need for financial aid and other counseling among students who lose them. Institutions should also consider supports, such as micro grants, that cushion the financial loss and that are also conditioned on students taking steps to improve their academic performance. More broadly, the state of Georgia could consider tiered scholarship reductions and other incremental or phased incentives rather than an all-or-nothing approach to motivate academic achievement.

The substantial differences in initial scholarship receipt and scholarship dynamics among students of different races and ethnicities, genders, and economic circumstances, suggest that institutions target scholarship-related support to vulnerable groups. More research is needed, though, to identify and explore the mechanisms underlying these risk factors and to develop policies aimed explicitly at reducing disparities in scholarship receipt.

Race and income-based disparities in the initial receipt of full-tuition Zell Miller Scholarships are substantially wider than for the partial-tuition HOPE Scholarship. In addition to the higher high school GPA requirement, the Zell Miller Scholarship requires minimum standardized test scores for eligibility, which may contribute to these disparities. Notably, the test score requirements prevent students from earning a Zell Miller Scholarship in college even with a very high college GPA. Eliminating standardized test requirements could help reduce initial disparities in full scholarship receipt.

We find higher risks of scholarship losses and lower rates of scholarship gains for students who

enter in the summer. Summer courses, which are offered on a compressed schedule, are structured differently from other courses and have different demands. Scholarship students might benefit from specialized advising that helps them choose summer courses in which they can be successful. Additional research can help identify whether certain types of summer courses place students at particularly high risk of scholarship loss.

The descriptive and multivariate analyses indicate that losses and gains of scholarships are more likely to occur early in a spell rather than later. These associations partly stem from GPAs—the key criteria for keeping or gaining a scholarship—becoming less changeable as students' credit hours increase. They may also occur if early success motivates students to continue that success. The results have intuitive implications for the timing of supports; proactive supports should be targeted to occur upon entry into college and during the freshman year, while reactive supports should be targeted to occur when or immediately after a transition occurs.

Georgia, like other states with broad-based merit scholarship programs, spends substantial sums of money each year on this type of financial aid. To maximize the potential benefits to the state, these programs must not only increase college enrollment but also increase persistence and graduation. Previous research has found that scholarship loss reduces the likelihood of graduation (Henry et al., 2004), so steps to improve scholarship retention could generate long-term economic benefits. The analyses in this paper provide a starting point for efforts to improve scholarship retention, increase scholarship gains, and reduce disparities in these dynamics over students' college careers.

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Table 1. Numbers and Scholarship Status of Entering In-state Students with Different Characteristics

	Observations	Percent who entered with a Zell Miller Scholarship	Percent who entered with a HOPE Scholarship	Percent who entered without these scholarships
All students	175,519	16.2	52.4	31.3
White	91,087	22.3	56.3	21.4
Black	48,345	3.6	46.3	50.1
Hispanic	14,738	10.4	51.5	38.1
Asian	11,984	28.3	50.4	21.3
Other race or unknown	9,365	16.2	51.0	32.8
Man	77,577	15.4	47.5	37.2
Woman	97,942	16.9	56.4	26.7
HS GPA below 3.0	44,961	0.0	7.5	92.5
HS GPA 3.0 – 3.3	33,705	0.1	77.1	22.8
HS GPA 3.3 – 3.7	41,862	2.3	93.0	4.8
HS GPA above 3.7	51,772	53.0	45.4	1.7
HS GPA missing	3,219	2.6	7.6	89.8
ACT 20 or lower	49,878	0.4	46.9	52.7
ACT 21 – 25	67,305	2.3	71.3	26.4
ACT 26 or higher	50,939	52.5	39.3	8.2
No ACT score	7,397	0.4	8.4	91.2
AGI below $30K	40,111	6.4	47.9	45.7
AGI $30K – $100K	62,763	12.6	55.0	32.4
AGI above $100K	57,845	26.7	56.4	17.0
AGI missing	14,800	17.5	38.5	44.1
No Pell grant	99,954	22.4	53.3	24.3
Pell grant	75,565	8.1	51.3	40.6
No student loans	86,118	22.5	53.6	23.8
Student loans	89,401	10.1	51.3	38.6
Financially dependent	169,051	16.8	53.4	29.9
Financially independent	6,468	2.6	27.5	69.9
Entered AY 2013-14	31,408	13.3	53.6	33.1
Entered AY 2014-15	34,559	14.6	52.9	32.5
Entered AY 2015-16	35,996	15.7	52.8	31.5
Entered AY 2016-17	36,686	17.0	52.4	30.6
Entered AY 2017-18	36,870	20.1	50.6	29.3
Entered summer term	10,562	15.7	43.6	40.7
Entered fall term	153,595	17.3	54.5	28.2
Entered spring term	11,362	2.7	32.6	64.7
Research university	53,699	40.1	49.0	11.0
Comprehensive univ.	63,416	6.3	61.4	32.3
State university	37,759	7.0	54.1	38.9
State college	20,645	1.8	30.8	67.4

Notes. Authors' calculations using administrative data on in-state students who entered USG institutions as first-time freshmen in bachelor's programs in Fall 2013 through Spring 2018.

Table 2. Hazard and Cumulative Probabilities of Scholarship Spell Transitions at Different Durations

	Hazard probability			Cumulative probability		
	1st to 2nd period	2nd to 3rd period	3rd to 4th period	1st to 2nd period	2nd to 3rd period	3rd to 4th period
Entered with Zell Miller Scholarship						
Transition to HOPE Scholarship	.094	.056	.032	.094	.141	.166
Transition to Neither Scholarship	.067	.017	.010	.067	.081	.089
Continue with scholarship				.840	.778	.745
Entered with HOPE Scholarship						
Transition to neither scholarship	.300	.123	.054	.300	.386	.420
Continue with scholarship				.700	.614	.580
Entered with neither scholarship						
Transition to HOPE Scholarship	.193	.060	.042	.193	.242	.274
Continue without scholarship				.807	.758	.726
Non-entering scholarship spell						
Transition to no scholarship	.180	.097		.180	.259	
Continue with scholarship				.820	.741	
Non-entering non-scholarship spell						
Transition to scholarship	.181	.119		.181	.278	
Continue without scholarship				.819	.722	

Notes. Authors' calculations of Kaplan-Meier hazards and cumulative probabilities using administrative data on in-state students who entered USG institutions as first-time freshmen in bachelor's programs in Fall 2013 through Spring 2018.

Table 3. Selected Coefficients from the Event-History Models of Scholarship Dynamics

Spell:	Entered with Zell Miller Scholarship		Entered with HOPE Scholarship	Entered with neither scholarship	Non-entering scholarship	Non-entering no scholarship	Continued in sample	Initial scholarship status	
Transition to:	Neither Scholarship	HOPE Scholarship	Neither scholarship	HOPE Scholarship	Neither scholarship	Scholarship	Left sample	HOPE Scholarship	Zell Miller Scholarship
2nd period of spell	-1.281*** (0.073)	-0.592*** (0.044)	-0.835*** (0.025)	-1.381*** (0.043)	-0.349*** (0.094)	-0.319*** (0.080)	0.319*** (0.044)	-	-
3rd period of spell	-1.877*** (0.115)	-1.255*** (0.066)	-1.631*** (0.040)	-1.776*** (0.066)	-	-	0.072 (0.066)	-	-
2nd check-in period	-	-	-	-	0.449*** (0.078)	0.088 (0.061)	-	-	-
Black	0.525*** (0.092)	0.153* (0.075)	0.310*** (0.024)	-0.382*** (0.043)	0.514*** (0.081)	-0.268*** (0.058)	-0.284*** (0.019)	-0.459*** (0.022)	-0.696*** (0.047)
Hispanic	-0.055 (0.111)	0.017 (0.078)	0.028 (0.032)	-0.163** (0.056)	0.058 (0.110)	-0.195* (0.083)	-0.265*** (0.024)	-0.566*** (0.033)	-0.847*** (0.057)
Asian	0.018 (0.081)	0.083 (0.057)	0.005 (0.036)	0.100 (0.067)	0.111 (0.106)	-0.100 (0.084)	-0.309*** (0.028)	-1.005*** (0.046)	-1.812*** (0.065)
Other race or unknown	0.125 (0.107)	-0.133 (0.086)	0.188*** (0.039)	-0.095 (0.069)	0.268* (0.120)	-0.091 (0.092)	0.018 (0.027)	-0.363*** (0.040)	-0.664*** (0.069)
Woman	-0.653*** (0.053)	-0.420*** (0.037)	-0.509*** (0.019)	0.355*** (0.033)	-0.528*** (0.059)	0.591*** (0.051)	-0.187*** (0.013)	0.120*** (0.018)	0.381*** (0.031)
Age at entry	-0.043 (0.076)	-0.074 (0.048)	-0.048* (0.020)	-0.107*** (0.014)	0.044 (0.029)	-0.050 (0.043)	-0.011** (0.004)	-0.416*** (0.021)	-0.510*** (0.036)
HS GPA	-3.486*** (0.228)	-2.316*** (0.155)	-2.202*** (0.055)	1.341*** (0.065)	-0.750*** (0.095)	1.275*** (0.131)	-0.769*** (0.035)	7.232*** (0.053)	16.681*** (0.104)

Spell:	Entered with Zell Miller Scholarship		Entered with HOPE Scholarship	Entered with neither scholarship	Non-entering scholarship	Non-entering no scholarship	Continued in sample	Initial scholarship status	
Transition to:	Neither Scholarship	HOPE Scholarship	Neither scholarship	HOPE Scholarship	Neither scholarship	Scholarship	Left sample	HOPE Scholarship	Zell Miller Scholarship
ACT composite score	-0.167***	-0.146***	-0.081***	0.087***	0.002	0.039***	-0.003	0.000	0.435***
	(0.012)	(0.008)	(0.004)	(0.006)	(0.011)	(0.008)	(0.002)	(0.003)	(0.006)
ln (adjusted gross income)	-0.027	0.016	-0.024***	0.034***	-0.016	0.023	-0.032***	0.034***	0.003
	(0.017)	(0.016)	(0.006)	(0.010)	(0.019)	(0.015)	(0.004)	(0.006)	(0.012)
Received Pell grant	0.187**	0.032	0.102***	0.046	0.005	-0.260***	0.072***	-0.167***	-0.181***
	(0.071)	(0.054)	(0.021)	(0.038)	(0.075)	(0.053)	(0.014)	(0.022)	(0.039)
Received student loan	0.352***	0.244***	0.204***	-0.073*	0.078	-0.129**	0.000	-	-
	(0.055)	(0.040)	(0.018)	(0.036)	(0.064)	(0.047)	(0.013)		
Financially independent	0.739**	0.715**	0.219**	-0.352***	0.672***	-0.103	0.187***	-0.271***	-0.790***
	(0.276)	(0.224)	(0.068)	(0.104)	(0.171)	(0.153)	(0.036)	(0.069)	(0.148)
Entered summer term	0.400***	0.320***	0.173***	-0.030	0.453***	-0.234**	0.124***	-	-
	(0.092)	(0.071)	(0.038)	(0.061)	(0.107)	(0.086)	(0.025)		
Entered spring term	0.146	0.259	0.149**	-0.146*	0.067	-0.204	0.589***	-	-
	(0.258)	(0.182)	(0.047)	(0.058)	(0.132)	(0.129)	(0.031)		
Georgia Inst. of Technology	1.999***	1.823***	1.497***	-1.826***	-0.267	-0.120	-1.671***	-	-
	(0.236)	(0.204)	(0.089)	(0.422)	(0.188)	(0.148)	(0.059)		
Georgia State University	-1.288***	-0.039	-0.316***	0.381***	-0.413**	0.506***	-0.771***	-	-
	(0.287)	(0.220)	(0.043)	(0.065)	(0.140)	(0.116)	(0.033)		
University of Georgia	0.223	0.765***	0.401***	-0.052	-0.386*	0.417***	-1.371***	-	-
	(0.222)	(0.196)	(0.048)	(0.172)	(0.164)	(0.120)	(0.042)		

Spell:	Entered with Zell Miller Scholarship		Entered with HOPE Scholarship	Entered with neither scholarship	Non-entering scholarship	Non-entering no scholarship	Continued in sample	Initial scholarship status	
Transition to:	Neither Scholarship	HOPE Scholarship	Neither scholarship	HOPE Scholarship	Neither scholarship	Scholarship	Left sample	HOPE Scholarship	Zell Miller Scholarship
Entered with HOPE Schol.	-	-	-	-	-	-	-0.327*** (0.029)	-	-
Entered with Zell Miller Schol.	-	-	-	-	-	-	-0.513*** (0.058)	-	-
Random effect loading	1.165*** (0.107)	0.224** (0.087)	1.000	-1.259*** (0.082)	1.000	-1.379*** (0.170)	1.483*** (0.201)	-0.207*** (0.023)	-0.360*** (0.059)
Random effect variance					0.640*** (0.085)				
Spells	26,086		74,057	31,610	8,706	18,355	174,402	-	
Periods/obs.	51,335		130,383	51,976	11,774	25,884	345,259	175,514	

Notes. Authors' estimates from joint models of scholarship status spells, attrition, and initial scholarship status, using administrative AY 2013-14 to 2018-19 data from the USG. Models also include controls for missing high school GPA, ACT score, or AGI information, the student's year of entry, and most of the institution fixed effects. Estimated robust standard errors appear in parentheses.
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

APPENDIX A. CONSTRUCTION OF THE ANALYSIS MEASURES

Longitudinal identifiers. We link records for students over time using a person identifier that is constructed by the Georgia Policy Labs by matching information for the students' names, dates of birth, social security numbers, USG identifying number, and campus identifier.

Check-in periods. We organize the term-by-term information for students into approximate "check-in" periods that correspond to the periods after students enroll or attempt 30, 60, or 90 credit hours. We measure credit hours using the cumulative attempted credit hours within the student's institution. We subtract Advanced Placement, International Baccalaureate, and other hours that the student may have earned before entering the institution and add transfer hours that the student earned.

Scholarship receipt and transitions. We use a three-way, mutually exclusive categorization of scholarship receipt within each period that indicates whether the student

- could be matched to a Zell Miller Scholarship record at any time during the period,
- could be matched to a HOPE Scholarship at any time during the period but not a Zell Miller Scholarship, or
- could not be matched to either scholarship during the period.

Note that scholarship receipt is indicated by the presence of a match. We measure transitions as changes in scholarship status from one check-in period to the next.

Demographic characteristics. We form mutually exclusive indicators of whether the student identified in their first enrollment term as non-Hispanic White, non-Hispanic Black, Hispanic, or Asian. We also form a composite indicator that includes other racial or ethnic identities, having multiple racial or ethnic backgrounds, or not providing racial or ethnic information. We create indicators of whether the student identified that they were a man or women and a variable of the student's age in years at the start of their first enrollment term.

High school GPA. We construct a measure of the high school GPA reported to the institution at

the first enrollment term. If the GPA was not reported, we set the GPA measure to zero. We also form an indicator of whether the GPA was not reported.

ACT composite score or equivalent. We construct measures of students' ACT composite scores and combined SAT math and reading/writing scores. Using concordance tables provided by the ACT, we convert the combined SAT scores to ACT equivalents. We form a measure of the highest score reported to the institution at the first enrollment term. If scores were not reported, we set the underlying score measure to zero. We also form an indicator of whether scores were not reported.

Financial circumstances. Using the financial aid summary file, we form measures of the student's or family's adjusted gross income and of whether the student reported being financially independent of their parent for financial aid purposes. Note that these measures are usually only reported if the student completed a Free Application for Federal Student Aid form and submitted it to a USG institution. For both measures, we use the values that were recorded in the first term of a check-in period. We adjust the adjusted gross income (AGI) for inflation using the Consumer Price Index for Urban Consumers and express amounts in 2019 dollars. We form an indicator for whether the AGI is missing and set the log transformed measure for missing values to zero. We create indicators for whether the student could be matched to a positive Pell grant or student loan amount in the first term of each check-in period. Note that aid receipt is indicated by the presence of a positive-value match.

Entry term and year. We construct indicators for whether the student first enrolled in the fall, spring, or summer academic terms and for the academic year of entry.

Institution and institution type. We construct indicators for the institution where the student enrolled. For institutions that consolidated during our period of analysis, we use the consolidated institution identifier. We use the USG's categorization of institutions as research universities, comprehensive universities, state universities, or state colleges.

APPENDIX B. ALTERNATIVE SPECIFICATIONS OF THE EVENT-HISTORY MODELS

Table B1. Selected Estimates from Event-History Models That Omit Controls for Unobserved Heterogeneity, Attrition, and Initial Conditions

Spell:	Entered with Zell Miller Scholarship		Entered with HOPE Scholarship	Entered with neither scholarship	Non-entering scholarship	Non-entering no scholarship
Transition to:	Neither Scholarship	HOPE Scholarship	Neither scholarship	HOPE Scholarship	Neither scholarship	Scholarship
2nd period of spell	-1.401*** (0.069)	-0.610*** (0.043)	-1.040*** (0.019)	-1.258*** (0.041)	-0.464*** (0.084)	-0.542*** (0.057)
3rd period of spell	-2.078*** (0.111)	-1.286*** (0.065)	-1.933*** (0.033)	-1.589*** (0.063)	-	-
2nd check-in period	-	-	-	-	0.444*** (0.068)	-0.112* (0.049)
Black	0.494*** (0.084)	0.148* (0.075)	0.290*** (0.021)	-0.388*** (0.038)	0.481*** (0.075)	-0.237*** (0.049)
Hispanic	-0.033 (0.103)	0.021 (0.079)	0.050 (0.029)	-0.181*** (0.048)	0.079 (0.104)	-0.214** (0.073)
Asian	0.035 (0.076)	0.087 (0.057)	0.054 (0.033)	0.016 (0.057)	0.145 (0.098)	-0.145* (0.071)
Other race or unknown	0.117 (0.100)	-0.134 (0.085)	0.160*** (0.034)	-0.070 (0.061)	0.233* (0.114)	-0.048 (0.080)
Woman	-0.591*** (0.048)	-0.409*** (0.036)	-0.430*** (0.016)	0.279*** (0.028)	-0.429*** (0.054)	0.428*** (0.037)
Age at entry	-0.053 (0.072)	-0.075 (0.048)	-0.044* (0.018)	-0.096*** (0.012)	0.036 (0.026)	-0.042 (0.036)
HS GPA	-2.998*** (0.185)	-2.245*** (0.144)	-1.819*** (0.028)	0.956*** (0.044)	-0.277*** (0.078)	0.620*** (0.065)
ACT composite score	-0.152*** (0.011)	-0.143*** (0.008)	-0.069*** (0.003)	0.071*** (0.005)	0.015 (0.010)	0.022*** (0.006)
ln (adjusted gross income)	-0.022 (0.016)	0.016 (0.015)	-0.018*** (0.005)	0.025** (0.009)	-0.008 (0.018)	0.012 (0.013)

Spell:	Entered with Zell Miller Scholarship		Entered with HOPE Scholarship	Entered with neither scholarship	Non-entering scholarship	Non-entering no scholarship
Transition to:	Neither Scholarship	HOPE Scholarship	Neither scholarship	HOPE Scholarship	Neither scholarship	Scholarship
Received Pell grant	0.176**	0.028	0.090***	0.045	-0.003	-0.223***
	(0.066)	(0.054)	(0.019)	(0.034)	(0.071)	(0.047)
Received student loan	0.321***	0.240***	0.190***	-0.076*	0.075	-0.102*
	(0.051)	(0.040)	(0.016)	(0.033)	(0.060)	(0.042)
Financially independent	0.644**	0.696**	0.177**	-0.287**	0.557***	-0.030
	(0.239)	(0.219)	(0.061)	(0.096)	(0.158)	(0.135)
Entered summer term	0.360***	0.315***	0.150***	-0.010	0.394***	-0.168*
	(0.085)	(0.071)	(0.034)	(0.053)	(0.099)	(0.074)
Entered spring term	0.101	0.246	0.058	0.001	-0.072	-0.045
	(0.242)	(0.181)	(0.042)	(0.051)	(0.124)	(0.112)
Georgia Inst. of Technology	1.911***	1.809***	1.441***	-1.780***	-0.173	-0.243
	(0.227)	(0.201)	(0.076)	(0.350)	(0.176)	(0.127)
Georgia State University	-1.200***	-0.029	-0.230***	0.262***	-0.289*	0.281**
	(0.282)	(0.218)	(0.038)	(0.055)	(0.130)	(0.098)
University of Georgia	0.256	0.771***	0.441***	-0.178	-0.199	0.166
	(0.218)	(0.194)	(0.043)	(0.149)	(0.154)	(0.103)
Spells	26,086		74,057	31,610	8,706	18,354
Periods	51,335		130,383	51,976	11,774	25,883

Notes. Authors' estimates from models of scholarship status spells, using administrative AY 2013-14 to 2018-19 data from the USG. Models also include controls for missing high school GPA, ACT score, or AGI information, the student's year of entry, and most of the institution fixed effects. Estimated robust standard errors appear in parentheses.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table B2. Selected Estimates from Event-History Models Estimated for Women

Spell:	Entered with Zell Miller Scholarship		Entered with HOPE Scholarship	Entered with neither scholarship	Non-entering scholarship	Non-entering no scholarship
Transition to:	Neither Scholarship	HOPE Scholarship	Neither scholarship	HOPE Scholarship	Neither scholarship	Scholarship
2nd period of spell	-1.125*** (0.119)	-0.545*** (0.062)	-0.616*** (0.064)	-1.076*** (0.094)	0.194 (0.207)	0.067 (0.160)
3rd period of spell	-1.482*** (0.178)	-1.203*** (0.095)	-1.369*** (0.091)	-1.190*** (0.137)	-	-
2nd check-in period	-	-	-	-	1.003*** (0.177)	0.267* (0.109)
Black	0.723*** (0.143)	0.224* (0.098)	0.362*** (0.044)	-0.528*** (0.091)	0.531*** (0.137)	-0.368*** (0.089)
Hispanic	0.127 (0.184)	0.073 (0.111)	0.072 (0.053)	-0.272* (0.110)	0.091 (0.189)	-0.356** (0.121)
Asian	0.307* (0.133)	0.264** (0.081)	0.201** (0.064)	-0.102 (0.145)	0.263 (0.187)	-0.371** (0.131)
Other race or unknown	0.282 (0.178)	-0.114 (0.123)	0.330*** (0.066)	-0.421** (0.139)	0.390 (0.205)	-0.342* (0.139)
Age at entry	-0.048 (0.146)	-0.155* (0.076)	-0.043 (0.036)	-0.146*** (0.034)	-0.012 (0.095)	-0.007 (0.071)
HS GPA	-4.129*** (0.478)	-2.465*** (0.252)	-3.015*** (0.192)	1.967*** (0.207)	-1.519*** (0.237)	1.884*** (0.288)
ACT composite score	-0.216*** (0.025)	-0.178*** (0.013)	-0.121*** (0.009)	0.138*** (0.016)	-0.038 (0.021)	0.073*** (0.015)
ln (adjusted gross income)	0.002 (0.030)	0.033 (0.022)	-0.034*** (0.009)	0.064*** (0.019)	-0.020 (0.030)	0.038* (0.020)
Received Pell grant	0.198 (0.114)	0.127 (0.073)	0.182*** (0.032)	-0.006 (0.070)	0.185 (0.118)	-0.349*** (0.074)
Received student loan	0.417*** (0.090)	0.240*** (0.056)	0.242*** (0.030)	-0.128 (0.069)	0.185 (0.108)	-0.109 (0.068)

Spell:	Entered with Zell Miller Scholarship		Entered with HOPE Scholarship	Entered with neither scholarship	Non-entering scholarship	Non-entering no scholarship
Transition to:	Neither Scholarship	HOPE Scholarship	Neither scholarship	HOPE Scholarship	Neither scholarship	Scholarship
Financially independent	1.282**	1.255***	0.321**	-0.560**	0.683*	-0.264
	(0.452)	(0.257)	(0.105)	(0.200)	(0.287)	(0.204)
Entered summer term	0.378*	0.307**	0.219***	-0.065	0.487**	-0.288*
	(0.153)	(0.099)	(0.062)	(0.112)	(0.180)	(0.124)
Entered spring term	0.256	0.394	0.239**	-0.471***	0.270	-0.525**
	(0.438)	(0.253)	(0.081)	(0.127)	(0.243)	(0.203)
Georgia Inst. of Technology	2.734***	2.415***	2.095***	-3.069**	-0.117	-0.509*
	(0.426)	(0.309)	(0.198)	(1.142)	(0.331)	(0.249)
Georgia State University	-1.045*	-0.118	-0.278***	0.475***	-0.579*	0.547***
	(0.445)	(0.329)	(0.069)	(0.130)	(0.226)	(0.162)
University of Georgia	0.357	1.027***	0.481***	-0.418	-0.486	0.310
	(0.378)	(0.294)	(0.083)	(0.347)	(0.270)	(0.172)
Random effect loading	1.086***	0.275**	1.000	-1.299***	1.000	-1.027***
	(0.115)	(0.093)		(0.155)		(0.143)
Random effect variance			2.209***			
			(0.473)			
Spells	15,162		44,630	13,942	4,600	9,890
Periods	30,394		80,824	22,827	6,239	13,912

Notes. Authors' estimates from joint models of scholarship status spells, attrition, and initial scholarship status, using administrative AY 2013-14 to 2018-19 data for women from the USG. Models also include controls for missing high school GPA, ACT score, or AGI information, the student's year of entry, and most of the institution fixed effects. Results for attrition and initial scholarship status models not shown. Estimated robust standard errors appear in parentheses.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table B3. Selected Estimates from Event-History Models Estimated for Men

Spell:	Entered with Zell Miller Scholarship		Entered with HOPE Scholarship	Entered with neither scholarship	Non-entering scholarship	Non-entering no scholarship
Transition to:	Neither Scholarship	HOPE Scholarship	Neither scholarship	HOPE Scholarship	Neither scholarship	Scholarship
2nd period of spell	-1.332*** (0.099)	-0.624*** (0.063)	-0.890*** (0.033)	-1.494*** (0.062)	-0.551*** (0.123)	-0.395** (0.129)
3rd period of spell	-2.140*** (0.173)	-1.285*** (0.095)	-1.654*** (0.054)	-2.106*** (0.105)	-	-
2nd check-in period	-	-	-	-	0.241* (0.104)	0.117 (0.098)
Black	0.428** (0.142)	0.059 (0.123)	0.321*** (0.036)	-0.330*** (0.059)	0.620*** (0.113)	-0.300** (0.101)
Hispanic	-0.167 (0.147)	-0.026 (0.111)	0.018 (0.047)	-0.148 (0.078)	0.047 (0.146)	-0.056 (0.135)
Asian	-0.189 (0.112)	-0.107 (0.083)	-0.098* (0.050)	0.196* (0.084)	0.078 (0.134)	0.089 (0.127)
Other race or unknown	0.020 (0.144)	-0.145 (0.122)	0.096 (0.055)	0.084 (0.092)	0.251 (0.158)	0.131 (0.145)
Age at entry	-0.026 (0.092)	-0.025 (0.063)	-0.046 (0.026)	-0.091*** (0.018)	0.067 (0.047)	-0.088 (0.065)
HS GPA	-3.536*** (0.306)	-2.291*** (0.217)	-1.924*** (0.057)	1.287*** (0.078)	-0.585*** (0.117)	1.454*** (0.209)
ACT composite score	-0.153*** (0.016)	-0.121*** (0.011)	-0.065*** (0.004)	0.076*** (0.007)	0.016 (0.014)	0.032** (0.011)
ln (adjusted gross income)	-0.057* (0.022)	-0.003 (0.023)	-0.019* (0.009)	0.020 (0.014)	-0.024 (0.026)	0.005 (0.026)
Received Pell grant	0.161 (0.097)	-0.085 (0.082)	0.013 (0.032)	0.077 (0.053)	-0.131 (0.105)	-0.193* (0.092)
Received student loan	0.337*** (0.075)	0.263*** (0.058)	0.194*** (0.026)	-0.012 (0.049)	0.002 (0.086)	-0.192* (0.076)

Spell:	Entered with Zell Miller Scholarship		Entered with HOPE Scholarship	Entered with neither scholarship	Non-entering scholarship	Non-entering no scholarship
Transition to:	Neither Scholarship	HOPE Scholarship	Neither scholarship	HOPE Scholarship	Neither scholarship	Scholarship
Financially independent	0.372 (0.372)	-0.117 (0.441)	0.151 (0.111)	-0.136 (0.146)	0.592* (0.246)	0.169 (0.276)
Entered summer term	0.434*** (0.127)	0.307** (0.104)	0.143* (0.056)	0.003 (0.084)	0.518*** (0.145)	-0.258 (0.142)
Entered spring term	0.040 (0.335)	0.157 (0.264)	0.111 (0.067)	-0.078 (0.080)	-0.049 (0.174)	0.039 (0.193)
Georgia Inst. of Technology	1.597*** (0.305)	1.328*** (0.266)	1.275*** (0.110)	-1.621*** (0.455)	-0.326 (0.248)	-0.062 (0.230)
Georgia State University	-1.890*** (0.439)	0.090 (0.290)	-0.433*** (0.064)	0.385*** (0.087)	-0.405* (0.191)	0.575** (0.199)
University of Georgia	0.073 (0.286)	0.518* (0.257)	0.395*** (0.069)	0.126 (0.218)	-0.412 (0.222)	0.521** (0.201)
Random effect loading	1.292*** (0.175)	0.117 (0.139)	1.000	-1.270*** (0.124)	1.000	-2.110*** (0.393)
Random effect variance			0.402*** (0.056)			
Spells	10,909		29,147	16,053	4,001	8,422
Periods	20,924		49,171	26,535	5,396	11,915

Notes. Authors' estimates from joint models of scholarship status spells, attrition, and initial scholarship status, using administrative AY 2013-14 to 2018-19 data for men from the USG. Models also include controls for missing high school GPA, ACT score, or AGI information, the student's year of entry, and most of the institution fixed effects. Results for attrition and initial scholarship status models not shown. Estimated robust standard errors appear in parentheses.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table B4. Selected Estimates from Event-History Models Estimated for Research Universities

Spell:	Entered with Zell Miller Scholarship		Entered with HOPE Scholarship	Entered with neither scholarship	Non-entering scholarship	Non-entering no scholarship
Transition to:	Neither Scholarship	HOPE Scholarship	Neither scholarship	HOPE Scholarship	Neither scholarship	Scholarship
2nd period of spell	-1.407*** (0.084)	-0.713*** (0.050)	-0.731*** (0.045)	-1.618*** (0.112)	-0.318* (0.155)	-0.180 (0.157)
3rd period of spell	-1.858*** (0.125)	-1.428*** (0.076)	-1.412*** (0.069)	-1.777*** (0.163)	-	-
2nd check-in period	-	-	-	-	0.522*** (0.130)	0.166 (0.108)
Black	0.461*** (0.106)	0.168* (0.083)	0.445*** (0.049)	-0.384*** (0.115)	0.644*** (0.152)	-0.411*** (0.111)
Hispanic	-0.123 (0.124)	-0.026 (0.087)	0.152* (0.060)	-0.118 (0.153)	0.213 (0.189)	-0.395** (0.144)
Asian	0.055 (0.084)	0.075 (0.060)	0.228*** (0.054)	-0.103 (0.125)	0.210 (0.141)	-0.196 (0.109)
Other race or unknown	0.080 (0.119)	-0.137 (0.094)	0.311*** (0.069)	-0.235 (0.160)	0.395* (0.192)	-0.066 (0.146)
Woman	-0.577*** (0.060)	-0.387*** (0.042)	-0.397*** (0.036)	0.163* (0.082)	-0.566*** (0.100)	0.533*** (0.088)
Age at entry	-0.149 (0.082)	-0.073 (0.056)	-0.026 (0.039)	-0.001 (0.062)	-0.195 (0.117)	-0.061 (0.086)
HS GPA	-3.308*** (0.292)	-2.220*** (0.184)	-2.191*** (0.130)	1.253*** (0.183)	-0.877*** (0.206)	1.386*** (0.266)
ACT composite score	-0.183*** (0.014)	-0.164*** (0.009)	-0.091*** (0.007)	0.077*** (0.015)	-0.014 (0.019)	0.035* (0.014)
ln (adjusted gross income)	-0.035 (0.020)	0.013 (0.018)	-0.021 (0.011)	0.067* (0.027)	-0.052 (0.034)	0.081** (0.031)
Received Pell grant	0.103 (0.083)	-0.021 (0.064)	0.105** (0.040)	0.153 (0.097)	0.172 (0.134)	-0.181 (0.097)

Spell:	Entered with Zell Miller Scholarship		Entered with HOPE Scholarship	Entered with neither scholarship	Non-entering scholarship	Non-entering no scholarship
Transition to:	Neither Scholarship	HOPE Scholarship	Neither scholarship	HOPE Scholarship	Neither scholarship	Scholarship
Received student loan	0.307*** (0.063)	0.224*** (0.045)	0.147*** (0.034)	-0.034 (0.088)	0.054 (0.111)	-0.060 (0.084)
Financially independent	0.662 (0.350)	0.649* (0.285)	0.287* (0.139)	-0.536 (0.327)	0.510 (0.400)	-0.183 (0.293)
Entered summer term	0.392*** (0.097)	0.340*** (0.075)	0.138 (0.073)	-0.101 (0.121)	0.497** (0.159)	-0.049 (0.138)
Entered spring term	0.011 (0.404)	0.373 (0.242)	0.280** (0.090)	-0.507** (0.180)	0.270 (0.331)	-0.473* (0.236)
Georgia State University	-3.265*** (0.219)	-1.912*** (0.125)	-1.962*** (0.110)	1.971*** (0.465)	-0.410 (0.237)	0.731*** (0.189)
Augusta University	-2.417*** (0.283)	-1.455*** (0.169)	-0.996*** (0.113)	1.223* (0.482)	0.113 (0.304)	0.429* (0.203)
University of Georgia	-1.787*** (0.087)	-1.093*** (0.056)	-1.185*** (0.092)	1.654*** (0.474)	-0.151 (0.141)	0.620*** (0.145)
Random effect loading	0.978*** (0.100)	0.143 (0.084)	1.000	-1.230*** (0.169)	1.000	-1.328*** (0.263)
Random effect variance			0.949*** (0.188)			
Spells	20,023		22,372	4,032	3,606	5,731
Periods	39,184		41,690	6,456	5,002	8,108

Notes. Authors' estimates from joint models of scholarship status spells, attrition, and initial scholarship status, using administrative AY 2013-14 to 2018-19 data for USG research universities. Models also include controls for missing high school GPA, ACT score, or AGI information, and the student's year of entry. Results for attrition and initial scholarship status models not shown. Estimated robust standard errors appear in parentheses.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table B5. Selected Estimates from Event-History Models Estimated for Comprehensive Universities

Spell:	Entered with Zell Miller Scholarship		Entered with HOPE Scholarship	Entered with neither scholarship	Non-entering scholarship	Non-entering no scholarship
Transition to:	Neither Scholarship	HOPE Scholarship	Neither scholarship	HOPE Scholarship	Neither scholarship	Scholarship
2nd period of spell	-0.898*** (0.235)	-0.149 (0.148)	-0.863*** (0.057)	-1.480*** (0.070)	-0.452** (0.174)	-0.299* (0.136)
3rd period of spell	-2.411*** (0.544)	-0.419* (0.206)	-1.738*** (0.086)	-1.788*** (0.103)	-	-
2nd check-in period	-	-	-	-	0.476*** (0.139)	0.052 (0.101)
Black	0.776** (0.254)	0.114 (0.215)	0.239*** (0.036)	-0.336*** (0.063)	0.509*** (0.126)	-0.154 (0.088)
Hispanic	0.295 (0.349)	0.055 (0.258)	0.080 (0.051)	-0.288** (0.093)	0.055 (0.206)	-0.167 (0.135)
Asian	-0.968 (0.597)	-0.061 (0.280)	-0.174* (0.074)	0.186 (0.140)	-0.133 (0.285)	-0.047 (0.205)
Other race or unknown	0.483 (0.317)	0.148 (0.260)	0.196*** (0.059)	-0.060 (0.105)	0.296 (0.205)	-0.239 (0.156)
Woman	-1.157*** (0.202)	-0.712*** (0.126)	-0.607*** (0.041)	0.506*** (0.055)	-0.511*** (0.109)	0.662*** (0.088)
Age at entry	0.192 (0.221)	-0.149 (0.150)	-0.066 (0.037)	0.019 (0.028)	0.120 (0.091)	-0.031 (0.066)
HS GPA	-5.548*** (0.908)	-3.499*** (0.607)	-2.264*** (0.163)	1.324*** (0.150)	-1.056*** (0.248)	1.485*** (0.245)
ACT composite score	-0.145*** (0.040)	-0.077** (0.027)	-0.067*** (0.007)	0.086*** (0.011)	0.024 (0.020)	0.021 (0.014)
ln (adjusted gross income)	-0.019 (0.047)	-0.029 (0.036)	-0.022* (0.009)	0.045* (0.020)	-0.024 (0.038)	0.001 (0.024)
Received Pell grant	0.448* (0.186)	0.197 (0.142)	0.127*** (0.032)	0.059 (0.062)	-0.053 (0.128)	-0.344*** (0.084)

Spell:	Entered with Zell Miller Scholarship		Entered with HOPE Scholarship	Entered with neither scholarship	Non-entering scholarship	Non-entering no scholarship
Transition to:	Neither Scholarship	HOPE Scholarship	Neither scholarship	HOPE Scholarship	Neither scholarship	Scholarship
Received student loan	0.713*** (0.180)	0.423*** (0.123)	0.234*** (0.030)	-0.023 (0.058)	0.032 (0.108)	-0.281*** (0.075)
Financially independent	1.123 (0.633)	0.513 (0.496)	0.234* (0.113)	-0.463* (0.206)	0.005 (0.383)	0.085 (0.257)
Entered summer term	-0.559 (0.802)	-0.498 (0.484)	0.247*** (0.062)	-0.076 (0.094)	0.402 (0.213)	-0.494** (0.159)
Entered spring term	-0.086 (0.641)	-0.470 (0.529)	0.145 (0.086)	-0.303* (0.121)	-0.264 (0.295)	-0.085 (0.231)
Random effect loading	1.601*** (0.323)	0.841** (0.298)	1.000	-1.133*** (0.129)	1.000	-1.483*** (0.322)
Random effect variance			0.660* (0.281)			
Spells	3,421		30,827	11,852	2,825	7,820
Periods	6,705		52,987	20,108	3,779	11,132

Notes. Authors' estimates from joint models of scholarship status spells, attrition, and initial scholarship status, using administrative AY 2013-14 to 2018-19 data for USG comprehensive universities. Models also include controls for missing high school GPA, ACT score, or AGI information, the student's year of entry, and institution fixed effects. Results for attrition and initial scholarship status models not shown. Estimated robust standard errors appear in parentheses.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table B6. Selected Estimates from Event-History Models Estimated for State Universities

Spell:	Entered with Zell Miller Scholarship		Entered with HOPE Scholarship	Entered with neither scholarship	Non-entering scholarship	Non-entering no scholarship
Transition to:	Neither Scholarship	HOPE Scholarship	Neither scholarship	HOPE Scholarship	Neither scholarship	Scholarship
2nd period of spell	-0.617*	0.002	-0.817***	-1.151***	-0.377	-0.508**
	(0.241)	(0.150)	(0.056)	(0.106)	(0.234)	(0.159)
3rd period of spell	-2.044***	-0.535*	-1.611***	-1.520***	-	-
	(0.530)	(0.227)	(0.090)	(0.159)		
2nd check-in period	-	-	-	-	0.380*	0.061
					(0.194)	(0.133)
Black	0.459	0.092	0.367***	-0.241	0.495*	-0.347*
	(0.424)	(0.351)	(0.065)	(0.134)	(0.231)	(0.156)
Hispanic	-0.111	0.379	0.040	-0.207	-0.026	0.063
	(0.504)	(0.323)	(0.081)	(0.185)	(0.309)	(0.195)
Asian	-0.617	0.574	-0.123	0.524	0.340	0.132
	(0.786)	(0.363)	(0.126)	(0.289)	(0.388)	(0.315)
Other race or unknown	-0.236	-0.783	0.077	0.120	-0.032	-0.026
	(0.572)	(0.479)	(0.102)	(0.208)	(0.356)	(0.237)
Woman	-0.958***	-0.496***	-0.523***	0.426***	-0.639***	0.609***
	(0.193)	(0.135)	(0.044)	(0.089)	(0.141)	(0.105)
Age at entry	0.196	-0.075	-0.017	-0.083*	0.103	-0.032
	(0.251)	(0.172)	(0.044)	(0.041)	(0.096)	(0.114)
HS GPA	-3.401***	-2.321***	-2.468***	1.940***	-0.687**	0.887***
	(0.645)	(0.489)	(0.130)	(0.228)	(0.222)	(0.240)
ACT composite score	-0.134**	-0.146***	-0.085***	0.110***	-0.006	0.069***
	(0.047)	(0.030)	(0.008)	(0.018)	(0.024)	(0.018)
ln (adjusted gross income)	-0.012	0.053	-0.036**	0.028	0.031	-0.015
	(0.073)	(0.062)	(0.011)	(0.022)	(0.033)	(0.024)
Received Pell grant	0.437	0.117	0.137**	-0.264**	0.019	-0.249*
	(0.248)	(0.180)	(0.047)	(0.099)	(0.170)	(0.116)

Spell:	Entered with Zell Miller Scholarship		Entered with HOPE Scholarship	Entered with neither scholarship	Non-entering scholarship	Non-entering no scholarship
Transition to:	Neither Scholarship	HOPE Scholarship	Neither scholarship	HOPE Scholarship	Neither scholarship	Scholarship
Received student loan	0.296 (0.196)	0.195 (0.145)	0.136*** (0.040)	-0.142 (0.100)	0.129 (0.159)	0.169 (0.105)
Financially independent	-0.083 (1.097)	1.046 (0.617)	0.128 (0.136)	-0.267 (0.237)	0.860* (0.388)	-0.310 (0.281)
Entered summer term	0.555 (0.397)	0.056 (0.381)	0.134 (0.072)	0.149 (0.175)	0.505 (0.262)	-0.255 (0.174)
Entered spring term	0.808 (0.501)	0.482 (0.425)	0.005 (0.094)	-0.344* (0.142)	0.500* (0.244)	-0.035 (0.247)
Random effect loading	1.091** (0.346)	0.444 (0.303)	1.000	-2.007*** (0.298)	1.000	-0.956** (0.328)
Random effect variance			0.642*** (0.191)			
Spells	2,258		16,036	7,701	1,427	3,757
Periods	4,586		27,936	12,887	1,885	5,262

Notes. Authors' estimates from joint models of scholarship status spells, attrition, and initial scholarship status, using administrative AY 2013-14 to 2018-19 data for USG state universities. Models also include controls for missing high school GPA, ACT score, or AGI information, the student's year of entry, and institution fixed effects. Results for attrition and initial scholarship status models not shown. Estimated robust standard errors appear in parentheses.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table B7. Selected Estimates from Event-History Models Estimated for State Colleges

Spell:	Entered with Zell Miller Scholarship		Entered with HOPE Scholarship	Entered with neither scholarship	Non-entering scholarship	Non-entering no scholarship
Transition to:	Neither Scholarship	HOPE Scholarship	Neither scholarship	HOPE Scholarship	Neither scholarship	Scholarship
2nd period of spell	-0.633 (0.569)	0.090 (0.510)	-0.867*** (0.136)	-0.808*** (0.169)	-0.230 (0.511)	-0.194 (0.420)
3rd period of spell	0.101 (0.675)	-0.951 (0.886)	-1.723*** (0.226)	-1.716*** (0.296)	-	-
2nd check-in period	-	-	-	-	0.557 (0.406)	0.030 (0.313)
Black	-0.188 (0.889)	0.121 (1.308)	0.134 (0.115)	-0.585*** (0.165)	0.073 (0.329)	-0.128 (0.294)
Hispanic	0.177 (0.711)	0.098 (0.734)	-0.298* (0.122)	-0.098 (0.149)	-0.529 (0.345)	-0.329 (0.360)
Asian	-0.667 (1.056)	0.509 (0.574)	-0.431** (0.167)	0.279 (0.184)	-0.087 (0.378)	0.013 (0.390)
Other race or unknown	1.069 (0.701)	-0.177 (1.083)	0.188 (0.223)	-0.307 (0.250)	0.507 (0.443)	0.021 (0.518)
Woman	-0.871* (0.431)	-0.636 (0.536)	-0.443*** (0.098)	0.321** (0.113)	-0.351 (0.241)	0.552* (0.254)
Age at entry	0.674 (0.435)	0.499 (0.514)	-0.075 (0.073)	-0.156** (0.049)	0.248* (0.126)	-0.030 (0.161)
HS GPA	-3.358* (1.541)	-4.117 (2.926)	-2.648*** (0.433)	1.831*** (0.382)	-0.973* (0.486)	1.949* (0.937)
ACT composite score	-0.162* (0.079)	-0.029 (0.162)	-0.127*** (0.020)	0.119*** (0.024)	-0.027 (0.039)	0.026 (0.033)
ln (adjusted gross income)	-0.142 (0.135)	0.400 (0.541)	-0.028 (0.022)	0.028 (0.028)	-0.004 (0.083)	0.182 (0.108)
Received Pell grant	0.474 (0.589)	0.989 (0.762)	-0.042 (0.089)	0.150 (0.123)	0.216 (0.304)	-0.200 (0.252)

Spell:	Entered with Zell Miller Scholarship		Entered with HOPE Scholarship	Entered with neither scholarship	Non-entering scholarship	Non-entering no scholarship
Transition to:	Neither Scholarship	HOPE Scholarship	Neither scholarship	HOPE Scholarship	Neither scholarship	Scholarship
Received student loan	0.081 (0.511)	0.180 (0.657)	0.466*** (0.099)	-0.164 (0.114)	0.103 (0.262)	-0.712* (0.287)
Entered summer term	0.168 (1.113)	-0.356 (1.115)	0.304 (0.283)	0.294 (0.301)	-0.370 (0.732)	-0.302 (0.553)
Random effect loading	0.692 (0.599)	0.884 (1.456)	1.000	-1.449* (0.588)	1.000	-1.124 (1.023)
Random effect variance			1.363 (0.782)			
Spells	292		4,248	4,683	573	947
Periods	696		6,928	7,106	728	1,250

Notes. Authors' estimates from joint models of scholarship status spells, attrition, and initial scholarship status, using administrative AY 2013-14 to 2018-19 data for USG state colleges. Models also include controls for missing high school GPA, ACT score, or AGI information, and the student's year of entry. Results for attrition and initial scholarship status models not shown. Estimated robust standard errors appear in parentheses.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$