Student Responses to Merit Scholarship Retention Rules

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Abstract

A common justification for HOPE-style merit-aid programs is to promote and reward academic achievement, thereby inducing greater investments in human capital. However, grade-based eligibility and retention rules encourage other behavioral responses. Using data extracted from the longitudinal records of all undergraduates who enrolled at the University of Georgia (UGA) between 1989 and 1997, we estimate the effects of HOPE on course enrollment, withdrawal and completion, and the diversion of course taking from the academic year to the summer, treating non-residents as a control group.

First, we find that HOPE decreased full-load enrollment and increased course withdrawals among resident freshmen. The combination of these responses results in a 9.3% lower probability of full-load completion and almost a 1-credit reduction in completed credits. The credit-hour decline means that resident freshmen completed roughly 3,100 fewer courses between 1993 and 1997 because of HOPE. Second, the scholarship's influence on course-taking behavior is concentrated on students whose predicted freshmen GPAs places them on or below the scholarship-retention margin. Third, HOPE increased summer-school credits by 63% and 44% in the first two summers following matriculation. To the extent intertemporal substitution occurs between the first and second years in college, summer-school enrollment accounts for most of it.

1 Introduction

Introduced in 1993 and funded by a state lottery, Georgia's HOPE ("Helping Outstanding Pupils Educationally") Scholarship covers tuition, mandatory fees and a book allowance for all eligible degree-seeking high-school graduates at any of Georgia's public postsecondary institutions. The award value has accounted for at least 40% of the total cost of attendance at the state's top public universities, amounting to $4378 in the 2003-04 academic year. HOPE recipients attending in-state private institutions receive a fixed payment of $3000. To qualify for the scholarship, an entering freshman must have graduated from a Georgia high school since 1993 with at least a "B" average and be a Georgia resident. Eligibility is not restricted by family income.[1] To retain the scholarship a student must have a 3.0 cumulative grade-point average (GPA) at regular credit-hour checkpoints. Through July 2004, more than $1.4 billion in scholarship funds have been disbursed to more than 600,000 students.

Since 1993 fifteen other states have followed Georgia, adopting their own HOPE-style merit scholarships. These actions have typically been justified in three ways. One is to increase college enrollment; another is to keep the best and brightest from going to school out-of-state. Cornwell, Mustard and Sridhar (2004) find that Georgia's program raised total freshmen enrollment in Georgia colleges by about 6% between 1993 and 1997, but "keeping the best and brightest in state" accounts for as little as a quarter of the overall program effect. Further, the enrollment increase attributable to HOPE is less than 15% of scholarship recipients.

A third justification is to promote and reward academic achievement. Henry et al. (forthcoming) matched the academic records of 1,915 "borderline" HOPE-eligible Georgia high-school graduates with a group of 1,817 non-qualifiers, who graduated from high school in the same year with the same core-course GPA and matriculated at the same type of postsecondary institution.[2] They showed that students in the first group

[1] There were income restrictions in the first two years of the program. A household income cap was set at $66,000 in 1993 and raised to $100,000 in 1994, but abolished in 1995.

[2] The students in their sample graduated high school in 1995 when HOPE eligibility was determined

had higher college GPAs and probabilities of graduating in 4 years and completed more college credits. However, their findings cannot be construed as policy effects because both groups are influenced by HOPE; that is, qualifiers can become non-qualifiers and vice versa.

While the GPA requirements for HOPE eligibility and retention may promote academic achievement, they also encourage other behavioral responses like enrolling in fewer classes per term, withdrawing from classes when performing unsatisfactorily, and choosing less challenging courses.[3] Thus far, no attention has been devoted to these unintended consequences. We address this gap in the literature by examining the effects of HOPE's retention rules on academic choices in college. Using data from the longitudinal records of all undergraduates who enrolled at the University of Georgia (UGA) between 1989 and 1997, we estimate the effects of HOPE on course enrollment, withdrawal and completion, and the diversion of course taking from the academic year to the summer.[4] Our empirical strategy is to contrast the behavior of in-state and out-of-state students before and after HOPE was implemented, using the non-residents, who cannot receive the scholarship, as a control group. We find that HOPE decreased full-load enrollments and increased course withdrawals among resident freshmen. The combination of these responses is an 9.3% lower probability of full-load completion and an almost 1-credit reduction in annual course credits completed. The latter implies that between 1993 and 1997 resident freshmen completed over 3,100 fewer courses than they would have in the absence of HOPE. In addition, the scholarship's influence on course-taking behavior is concentrated on students whose GPAs place them on or below the scholarship-retention margin and increased as the income cap was lifted and more students received the award. Finally, in-state students diverted an average of 2.5 more credits from the regular aca-

by overall high-school GPA. Later the GPA requirement was changed to count only core-course grades.

[3]The only other study that examines HOPE's effect on academic achievement is Dee and Jackson (1999), which examined the incidence of scholarship loss in the 1996 entering class of Georgia Tech freshmen. They reported that computing, engineering, and science majors were more likely to lose their awards, but did not address potential behavioral responses to the HOPE rules.

[4]These decisions do not exhaust the possibilities for HOPE's influence. For example, the scholarship could affect a student's choice of major or elective courses. We are currently examining the evidence for both of these responses in a separate paper.

demic year to the first two summer terms after their matriculation.

2 Data

Our data come from three sources. The Office of Student Financial Aid provided each student's HOPE status. From the Registrar's Office, we obtained credit hours enrolled, attempted and earned, cumulative GPA, matriculation and graduation terms (if available), high-school GPA (HSGPA), and advanced placement (AP) credits. Finally, the Undergraduate Admissions Office provided pre-college and personal characteristics such as SAT scores, high school attended, residency, ethnicity, gender, and age.[5]

Over the sample period, about 38,200 enrollees appear in the dataset. However, because we are concerned with how HOPE affects academic choices from the outset of a college career, we limit the sample to (the nearly 33,000) students who enrolled at UGA as first-time freshmen (FTF). Further, we restrict attention to those FTF we regard as "typical"—students who matriculated at UGA in the fall term of the same year as they graduated from high school. Thus we exclude individuals who entered UGA before graduating from high school, during the summer term after they graduated from high school, and after the fall term following their high-school graduation.[6] There are over 31,000 typical FTF in the sample, accounting for nearly 95% of all FTF from 1989-97.

After dropping to 3,042 in 1991, the number of typical FTF rose steadily to 4,165 in 1997. In HOPE's first year, when a $66,000 income cap was in force, only 35.2% (949) of Georgia FTF entered with the scholarship. In 1994, the income cap was increased to $100,000 and this percentage increased to 75.5. After the income cap was removed in 1995, almost all resident, typical FTF started their careers at UGA as HOPE Scholars.

Table **??** reports the means and standard deviations of the variables used in our anal-

[5]The College Board recentered SAT scores for tests taken on or after 1 April 1995 to reestablish the average SAT I verbal and math scores near the midpoint of the 200-to-800 scale. SAT scores from the Admissions Office for students in 1989 through 1994 classes were on the original scale. We recentered pre-April 1995 SAT scores using the College Board's SAT I individual score conversion table.

[6]During our sample period there was very little variation and no discernible trend in the number of early or late matriculators.

ysis, separately for residents and non-residents, over the pre- and post-HOPE periods. The resident–non-resident contrasts shown in the first six rows preview our main results. For example, about the same percentage of resident and non-resident freshmen (64.2% vs. 63.5%) completed a full-course load between 1989 and 1992. However, after 1992 the full-load completion rates of these two groups diverged sharply, with the percentage of in-state students completing full loads dropping to 50.9% while out-of-state percentage remained near 60%.

3 Retention Rules and Academic Achievement

To retain HOPE a student must maintain a 3.0 GPA, which is evaluated at three checkpoints. If a student fails to meet meet the GPA standard, she loses the scholarship, but can re-establish eligibility at the next checkpoint if she raises her GPA back to the 3.0 threshold. Those who do not qualify for HOPE in high school can become eligible at each checkpont if their GPAs are at least 3.0. During our sample period, UGA operated on the quarter system where 45 credit hours (15 hours per quarter) was considered a full load for an academic year. The GPA checkpoints occurred at 45, 90, and 135 credit hours, corresponding to end of one's freshmen, sophomore, and junior years. In total HOPE would pay for 190 credit hours, the level required to earn a typical undergraduate degree. However, there was (and is) no time limit on a student's potential HOPE endowment, which can be spent in the summer under exactly the same terms as the regular academic year.

As discussed at the outset, the goal of tying scholarship retention to grades is to promote academic achievement. Insofar as academic achievement is measurable by improvements in students' grades, changes in the GPA distribution after 1993 suggest this goal is being met at some level. Panels (a) and (b) of Figure **??** plot the kernel density estimates of cumulative GPA distributions of typical UGA freshmen in the year prior to HOPE's introduction (1992) and the first "full coverage" year (1995, the year the income

cap was removed), by residency.[7] Prior to HOPE, the non-resident grade distribution lies to the right of the resident distribution and exhibits less variance. By 1995 the situation reversed, with the resident distribution exhibiting a conspicuous peak at 3.0, implying that HOPE contributed to the relative GPA gains for resident freshmen.

Some of these gains may be explained by the selection of relatively better in-state students in the admissions process. Consider panels (c)-(f) of Figure **??**, which show the kernel density estimates of the SAT math (SATM) and verbal (SATV) scores for 1992 and 1995, by residency. Before HOPE, non-residents typically entered UGA with higher SAT scores. After HOPE, there is no noticeable relative change in the resident SATM distribution, but SATV scores of in-state students exhibit some "catchup". Thus, based on SAT scores, the evidence for a substantial improvement in the relative quality of resident freshmen is not very strong. However, selection could have occurred in other quality measures such as HSGPAs and AP credits, and we investigate these possibilities more formally below.

Independent of selection, HOPE's retention rules encourage a variety of grade-enhancing behavioral responses. Students may increase their effort or substitute school work for market work, consistent with the goals of program. However, the scholarship also creates an incentive for adjusting course loads and difficulty to achieve the GPA objective. We examine on three particular responses.

One response is to enroll in fewer courses at the beginning of the term. A one-course reduction from a full load during the first year guarantees an extra term of funding by forestalling the HOPE checkpoint, no matter how low a student's GPA is. A lighter load may also translate into greater per-class effort and an increased likelihood of earning higher grades without raising overall effort. Because HOPE benefits have no time limit, any propensity to take lighter loads is exacerbated. A second response is to withdraw from classes when performing poorly. Withdrawn classes do not enter the GPA calculation, so students who are near the HOPE margin and not doing well

[7] We used the KDE procedure of SAS Version 8, a Gaussian kernel, and the Sheather-Jones plug-in method to compute the bandwidth.

in a class have an added inducement to withdraw. The combined effects of enrolling in lighter loads and withdrawing more frequently will reduce completed credits.

A third response is to choose classes where the expected grade is higher, all else equal. Such a choice could be made on the basis of course content or a professor's reputation for grading leniently. Alternatively, a student may defer course work to the summer, when grade distributions are significantly more generous. From 1989–92, the mean summer-term GPA of UGA freshmen was 2.89, compared with a fall-semester average of 2.57, and this 0.32-point difference widened after HOPE. Further, the fall-summer GPA differential shows up in all three major core-curriculum areas—humanities, mathematics and natural sciences, and social sciences. These higher summer grades are surprising because the typical summer enrollee is a "lower quality" student. The mean fall-summer SAT differential was 15 (1141 vs. 1126) points before HOPE and 16 points (1185 vs. 1169) thereafter.

To the extent that students attend classes more regularly and complete their assignments more assiduously, human capital investments will rise. Trading work hours for study hours may also increase human capital, since typical college-student jobs require few skills and involve little training. The human-capital consequences of these alternative behavioral responses is less clear. Taking fewer courses as a first-year student could aid in the transition to college and better facilitate learning throughout her college career. Conversely, the option to take fewer and less challenging courses has always existed and did not arise with the HOPE Scholarship. Moreover, at an institution like UGA, where most students come from middle- and upper-income households (65% of freshmen were ineligible for HOPE in 1993, when there was an income cap of $66,000), the scholarship does not likely figure in the decision to attend college, although it may affect the decision where to attend.[8] Thus, a reasonable conjecture is that the labor-market

[8]Examining IPEDS data covering the same time period as our analysis, Cornwell, Mustard and Sridhar (2004) find no statistically significant increase Georgia-resident freshmen recently graduated from high-school attending 4-year schools—which is precisely the population represented by the UGA freshmen in our sample. They also show that two-thirds of the total HOPE-induced enrollment increase in Georgia's 4-year colleges is explained by a reduction in the number of students leaving the state.

returns to academic choices should trump the scholarship incentives.

However, the course-taking decisions of freshmen operating under the HOPE rules suggest otherwise. Figure **??** shows that the rates of full-course-load enrollment for resident and non-resident freshmen diverged sharply after 1992. Between 1993 and 1997, the fraction of resident freshmen enrolled in a full load fell from 82% to 69%, while the percentage of non-resident full-load enrollees remained at 80% or above. Similarly, residents and non-residents withdrew at about the same rate before 1993, but after HOPE in-state students withdrew much more frequently (see Figure **??**). The combined effect of these responses, plotted in Figure **??**, was a precipitous decline in the resident full-load completion rate from 68% to 44%, with the rate for non-residents fluctuating fairly narrowly around 60% during the entire period. Figure **??** reflects the same story in summer-school enrollment, where residents increased their credit hours compared to non-residents after 1992.

4 Estimation and Results

4.1 Empirical Model

We identify the scholarship's effect on course-load adjustments and summer-school enrollment by contrasting the responses of residents before and after the HOPE "treatment" with those of non-residents who, because they cannot qualify for HOPE, serve as the control group.[9] In a regression context, this means estimating empirical models of

[9]The population of non-residents could still be affected by HOPE if states that traditionally supply students to UGA followed Georgia in adopting merit scholarships, or if the program allowed UGA to transfer institutional aid previously allocated to Georgia residents to out-of-state students. However, neither happened during our sample period in an empirically meaningful way. First, Florida's Bright Futures is the only other HOPE-like scholarship introduced and it did not start until the last year of our sample. Second, the only evidence for institutional aid transfers occurs in 1996 and 1997 when UGA began awarding Charter Scholarships (which provided about $2000 in direct aid and an out-of-state tuition waiver) to non-residents, but less than fifty of these scholarships were awarded in these two years to all (not just freshmen) out-of-state students.

the form

$$y_{itj} \quad = \quad \beta\, GA_i \cdot H_t + \alpha_1\, GA_i + \alpha_2\, H_t + X_i'\gamma + HS_j\, \delta + \epsilon_{itj}, \tag{1}$$

where y_{itj} is a behavioral response measure for student i from high school j in academic year t ($t = 89, 90, \ldots, 97$); H_t is a HOPE indicator that is set to 1 for students who matriculated after 1992; GA_i is a Georgia-resident dummy; X_i contains race, gender and class-year control variables; HS_j indicates a graduate of high school j; and ϵ_{itj} is the error term. The program effect is captured by β, the coefficient of the interaction between the HOPE and Georgia-resident dummies.

The high-school dummies control for unobserved pre-college peer influences that may affect course-taking decisions in college. For example, Gaviria and Raphael (2001) present evidence of strong school-level peer effects on tenth-graders' propensity to drink, use drugs, go to church, and drop out of high school. Each of these behaviors could have ramifications for a whole range of postsecondary academic choices, including those we investigate here.

The course-load and summer-school responses have both extensive and intensive margin expressions (e.g., whether enrolled in a full-course load vs. credit hours enrolled), and we estimate the HOPE effect for each case. Both kinds of outcomes (discrete and continuous) are estimated by OLS and heteroscedasticity-consistent standard errors are reported. To check our empirical strategy, we also determine whether the timing of the program effects coincides with HOPE's introduction by estimating (**??**) allowing β to vary over time. We expect stronger behavioral responses as the raising of the income cap increased the number of students eligible for the award and information about the retention rules became more widely diffused.

4.2 Selection

The average quality of both in-state and out-of-state students rose substantially after HOPE. Table **??** shows that the average resident SAT score, HSGPA, and AP

credits increased by 45.9, 0.28, and 1.8, respectively. Similarly, the non-resident averages jumped by 39.4, 0.22, and 2.0. We examine the relative gains in student quality by determining HOPE's effect on the SAT scores, HSGPAs and AP credits of Georgia freshmen, estimating regressions like (**??**) for each pre-college outcome. During our sample period these measures of high-school achievement were the sole determinants of admission for about 90 percent of applicants. Lee (2004) confirms their importance in predicting success in college. When SAT scores, HSGPAs, and AP credits are added to a regression of first-year college GPA on Georgia-resident, HOPE, race and gender dummies, the effects of race and gender are virtually eliminated. HSGPA is by far the most important determinant of first-year performance, with an estimated coefficient of 0.722.

The pre-college outcome results are given in Panel A of Table **??**. The SATV regression produces an estimated program effect of 9.3 with a t-ratio over 3. In contrast, the HOPE effect estimate for SATM scores is only 1.5 with a t-ratio well below 1. These findings are consistent with the SAT distribution changes shown in Figure **??**. The estimated HOPE effect for HSGPA is 0.065 with a t-ratio of about 4. However, it is unclear how much importance to assign the relative increase of HSGPA for in-state students, because just as the shifts in UGA grade distributions may be explained by behavioral responses, the same is true at the high-school level. The eligibility rules create many of the same incentives as the retention rules. Further, there is no scholarship effect on AP credits, which suggests that HOPE has not led Georgia high-schoolers to choose more advanced programs of study. Therefore, it does not follow that the relative improvement in residents' high-school grades represents an increase in the relative quality of in-state students. In sum, the direct evidence for selection is essentially limited to SATV scores.[10]

[10]As an additional check, we also allowed the HOPE effect to vary by year for each pre-college outcome. Consistent with the overall result for SATM scores and AP credits, none of year-specific coefficient estimates is statistically significant. In the cases of SATV scores and HSGPA, the estimated effects for the first three years of HOPE are positive, increasing, and statistically significant, whereas the post-1995 coefficient estimates are smaller and not statistically different from zero. Thus, the relative gains of residents are concentrated in the first three years of the program.

Finally, when we include the high-school achievement variables in our course-taking regressions, the program effect estimates change very little, but always in the direction of greater magnitude.[11] This is consistent with our finding that students with higher SATs and HSGPAs and more AP credits are less likely to withdraw from a course and more likely to enroll in and complete a full load. Thus, relative improvements in in-state student quality will cause our college outcome results to be biased *against* showing a scholarship effect.

4.3 Course Enrollment, Withdrawal, and Completion

Now we consider the evidence related to HOPE's influence on course-load adjustments. The main findings are presented in panels B and C of Table **??**.

Extensive Margins. The results in panel B indicate that HOPE reduced the probability of full-course-load enrollment by 4.2 percentage points and increased the likelihood of course withdrawal by the same amount. The combined impact of these behavioral responses is a 6-percentage point lower probability of completing a full-course load. Each estimated program effect is significant at the .01 level. Evaluated at the pre-HOPE means of each outcome, these estimates imply that the full-course-load enrollment rate fell by 5.1%, the withdrawal rate rose by 16.1%, and the full-load completion rate decreased by 9.3% because of the scholarship.

When we allow the HOPE effect to vary over time, the estimated pre-1993 effects are uniformly small and statistically insignificant for each outcome.[12] In contrast, after 1994 when the income cap was lifted, the coefficient estimates are larger in magnitude, have the "correct" sign, and are much more precisely estimated. Further, in each case the post-HOPE coefficient estimates increase in magnitude over the period. After the income cap is removed in 1995, the estimated HOPE effects for course withdrawal more than

[11] For example, in panel B of Table 2 we report an estimated HOPE effect of –.042 on the full-load enrollment probability. Controlling for SAT scores, HSGPAs, and AP credits raises this estimate to –.048. The difference between the two estimates in this case is typical of that we find in the other outcomes. See Cornwell, et al. (2003) for details.

[12] The results of the timing regressions are reported in Cornwell et al. (2003).

doubled, while the full-load enrollment and completion estimates rose by about 80%. By 1997, the scholarship had reduced the probability that a freshman would complete a full load by over 16 percentage points (relative to 1993). Clearly, as the income cap was eliminated and more students became eligible, HOPE's influence on grew.

Intensive Margins. The estimates in panel C show that the scholarship reduced completed credits hours by almost 1, with decreased enrollments and increased withdrawals each counting for half of the drop, consistent with the scholarship effects on each extensive-margin outcome. Both the completed and withdrawn-credits coefficient estimates are significant at the .01 level; the estimated coefficient for enrolled credits is less precise, but still significant at the .10 level.[13] A 1-credit per year HOPE-induced decline in credit hours means that between 1993 and 1997 Georgia residents completed over 15,710 fewer credit hours than non-residents, or about 3,142 fewer courses.

Allowing the HOPE effect to vary over time produces generally the same pattern as in the extensive margins. Again, all pre-HOPE coefficient estimates are statistically insignificant. At the end of the sample period, first-year residents were completing, on average, 1.8 fewer credit hours (compared with 1993 levels).

4.4 HOPE Effects Throughout the GPA Distribution

HOPE's influence on course-taking decisions should depend on a student's place in the GPA distribution. One who is far below the 3.0 threshold in her first year has a strong incentive to enroll in fewer courses, because she will otherwise lose HOPE at the first checkpoint. Delay will guarantee one extra term of funding. A student on the retention margin faces a similar, though probably weaker, incentive, as the probability of HOPE loss for her is lower. In contrast, an individual with a GPA well above 3.0, who is unlikely to lose the scholarship, may take more credit hours, as HOPE lowers the cost of enrolling in an additional course.

[13] Although its eligibility and retention rules are somewhat different, Binder and Ganderton (2002), in their study of New Mexico's merit-based SUCCESS Scholarship, report that program also led college students to reduce the number of registered and completed credit hours during their first two semesters.

To test these propositions, we examine the effects of the scholarship at three intervals of the grade distribution for first-year students: < 2.7, ≥ 2.7 and < 3.3, and ≥ 3.3. Because a student's realized GPA category is endogenous, we base our analysis on an ordered probit model's prediction of her category.[14] Using the pre-HOPE data only (to avoid any potential contamination by the program), we estimated the ordered probit and predicted the GPA interval each student will fall into for both pre- and post-HOPE samples.[15] Then, we repeat the analyses represented in panels B and C of Table **??** separately for the students predicted to be in each GPA category. Of the 30,703 first-year students (whose records contain high-school achievement variables and the name of high school attended), there are 18,653 students with predicted GPAs below 2.7, 7,092 between 2.7 and 3.3, and 4,958 of 3.3 and above.[16] Table **??** presents the results of this exercise.

Extensive Margins. The estimated HOPE effects on full-load completion, which reflect enrollment and withdrawal decisions, closely conform to our expectations. Students with predicted GPAs below 2.7 are 12.0 percentage points less likely to complete a full load; the largest of the effects. Those between 2.7 and 3.3 are 8.4 percentage points less likely to complete a full load. Students predicted to fall in the highest category are 7.7 percentage points more likely, suggesting that the scholarship promotes the academic progress of individuals with the greatest prospects for success at the university. The HOPE effect estimate for the lowest GPA interval is very precise, and all three estimates are significant at better than the .10 level.

Georgia residents with the lowest predicted GPAs are 5.8 percentage points less likely to enroll in a full load and 11.2 percentage points more likely to withdraw from a course because of HOPE. Students predicted to fall in the interval around 3.0 adjust primarily through course enrollment. They are 8.4 percentage points less likely to enroll in a full

[14]We are grateful to an associate editor for this suggestion.

[15]The GPA-interval regression includes controls for residency, gender, race, HSGPA, SATM and SATV scores, AP credits, and high-school effects. The estimation results are reported in Lee (2004).

[16]The bottom CGPA category is over-predicted by about 5000 students, while the middle and upper categories are roughly equally under-predicted.

load, but no more likely to withdraw. The estimates for students with predicted GPAs above 3.3 indicate a higher probability of full-load enrollment and a lower probability of withdrawal for residents, neither of which is precisely estimated.

Intensive Margins. The HOPE effect estimates for credits completed, enrolled and withdrawn follow the pattern of the corresponding extensive margin findings. In general, HOPE's influence weakens as predicted GPA rises and the most precisely estimated program responses are concentrated in the < 2.7 category. Georgia residents with the lowest predicted GPAs completed an average of 1.57 fewer credits, enrolling in .65 less and withdrawing from .92 more, during the HOPE period. The results also suggest that HOPE caused a .8-credit drop among students near the retention margin and a .7-credit rise among those predicted to be well above the 3.0 threshold, but both estimates fail to meet even the .20 level of significance.

To summarize, analyzing HOPE's impacts by predicted GPA confirms the proposition that the course-load reduction responses are concentrated among the students most affected by the retention rules. The same story emerges when this exercise is repeated in terms of HSGPA categories corresponding to eligibility status: < 3.0 (ineligible), ≥ 3.0 and < 3.5 (marginally eligible), and ≥ 3.5 ("safely" eligible). Students with HSGPAs lower than 3.0 and between 3.0 and 3.5 are less likely to complete a full load and complete fewer credit hours in their first year because of HOPE, while the effect for those with HSGPAs greater than 3.5 is essentially nil.

4.5 Intertemporal Substitution or Delay?

Do the program responses for Georgia-resident freshmen reflect decisions to intertemporally adjust their course loads—completing fewer credits in their first year and making up for it in their later years? Or, do these decisions slow their academic progress, leaving them behind their non-resident counterparts for the remainder of their undergraduate careers? We address these questions by estimating HOPE's effect on the extensive and intensive course-completion margins by school year.

In our sample, there are 31,117 typical students in their first year, 23,923 in their second year, 18,981 in their third year, and 14,755 in their fourth year. Some students drop out, but most of the attrition occurs because we can not follow 1995-97 entering classes through their fourth, third and second years, respectively.[17] We found no program effect on persisting at UGA beyond the first year. The coefficient estimates on the $GA \cdot H$ interaction were uniformly small and statistically insignificant.

Panel A of Table **??** presents the estimated HOPE effects on full-load completion and completed credits. The first-year results are reproduced from Table **??**. None of the HOPE effect estimates, on either margin, are statistically significant for students who are beyond their first year in school. These findings suggest that the retention rules do not simply encourage intertemporal substitution, but on balance, slow the typical resident's progression through college.

However, the estimates presented in panel A may be problematic for two reasons. First, the income cap weakens the experiment for the 1993 and 1994 classes, as residents are placed in the treatment group who are ineligible for the scholarship and not subject to its incentives. Second, the prospects for intertemporal substitution are somewhat obscured because the analysis unevenly lumps together several pre- and post-HOPE cohorts. As an alternative, panel B repeats the analysis, limiting the sample to only the 1990 and 1995 classes, the latter being the first "full-HOPE-coverage" cohort and the former being the most recent never to benefit from the scholarship. Although we cannot follow the 1995 class into its fourth year, two findings stand out from this experiment: (a) the first-year program effects are larger, and (b) the HOPE-induced drop in completed credits in the first year is erased in the second year. While completed credits are about 1.5 hours lower in the first year because of HOPE, they are 2 hours higher in the second year. Both estimates are statistically significant at the .05 level. In contrast to the results presented in panel A, the comparisons between the 1990 and 1995 classes cast

[17] Of course we cannot follow the 1995-97 classes to graduation either, for the same reasons. While this should be possible in principle for the 1993 and 1994 entering classes, only 36% of the 1993 class and and 44% of 1994 class graduated in four years.

doubt on the notion that the scholarship slows academic progress.

4.6 Summer-School Course Enrollment

Tying scholarship retention to grades also creates an incentive to enroll in classes where the expected grade is higher. We explore this behavioral response by examining the effect of HOPE on deferring course taking to the summer. As we discussed in section **??**, summer-school grade distributions are more generous even though summer-school students are lower quality than those enrolled in regular academic-year courses. The program effect estimates on enrollment and credits completed, for the summers following a student's first, second and third years, are reported in panel C of Table **??**.

On the extensive margin, there is some evidence that HOPE increased the probability that in-state students take courses in their first summer. The estimated HOPE effect is 7.1 percentage points with a t-ratio of about 1.6. However, the estimates for the second and third summers are much smaller and statistically insignificant.

The support for a program effect on the intensive margin is somewhat stronger. HOPE increased completed credits by 1.44 in the first summer, and by another 1.04 credits in the second; both estimates are significant at the .06 level. The estimated HOPE effect for the third summer is negative, but its standard error is three times as large. Evaluated at the pre-HOPE mean, the results for the first two summers imply that summer-school credits completed by Georgia residents rose 63% and 46% because of the scholarship.

Overall, the summer-school enrollment data indicate that HOPE induced students to divert course taking to the summer to meet HOPE retention requirements. Furthermore, the incentive to forestall the first checkpoint by taking fewer courses in the first year is balanced by the incentive to take courses in the first summer to improve their GPAs. To the degree intertemporal substitution occurs between the first and second academic years, taking classes in the intervening summer accounts for most of it.[18]

[18]Because the academic year runs from the summer to the next spring term, credit hours completed in the second year include credits completed in the summer immediately following the first academic

5 Conclusion

Following the introduction of Georgia's HOPE Scholarship in 1993, state-sponsored merit scholarships have proliferated, justified in part as inducements for academic achievement. While their GPA requirements for eligibility and retention encourage students to apply greater effort toward their studies, they also encourage other behavioral responses like adjusting course loads and difficulty. In this paper, we examine student responses to the eligibility and retention rules associated with the HOPE Scholarship. Using data on the undergraduates who enrolled at the University of Georgia between 1989 and 1997, we estimated the effects of HOPE on enrollment, withdrawal and completion, and the shifting of course credits to the summer, treating out-of-state students as a control group.

We find that HOPE reduced the probability of full-course load enrollment and enrolled credit hours, and increased the probability of course withdrawal and withdrawn credits for Georgia-resident freshmen. Together these responses amount to a 9.3% reduction in the likelihood of completing a full load and almost a 1-credit drop in completed credits. The credit-hour decline means that resident freshmen completed over 3,100 fewer courses between 1993 and 1997 than they would have in the absence of HOPE. Further, these course-load adjustments are concentrated among students whose predicted freshman GPA places them on or below the scholarship retention margin, and their timing and magnitude are consistent with the introduction of the scholarship and increase in the number of HOPE Scholars as the income restrictions were removed. However, the evidence is mixed on whether these course-load adjustments constitute a delay in academic progress or intertemporal substitution.

The diversion of course-taking to the summer is an example of adjusting course difficulty, as the average GPA of UGA freshmen is 10-15% higher in the summer than in the fall, even though the typical summer-school enrollee has a lower SAT score and HSGPA. We show that HOPE increased summer-school credits completed by Georgia residents

year, which is the first summer after matriculation for typical students.

by 63% and 44% in the first two summers following matriculation. The summer-school results suggest that, to the extent intertemporal substitution occurs between the first and second years, summer enrollment accounts for most it.

We conclude that HOPE's grade-based retention requirements lead to behavioral responses that partially undermine its objective to promote academic achievement by encouraging greater effort. While responses like taking fewer courses per term may enhance human capital investment, the option to slow one's progress toward degree completion existed prior to HOPE. Finally, given the over-riding importance of the labor market and that HOPE is infra-marginal to most UGA students' decisions *whether* to attend college, it is surprising that the scholarship has any influence on behavior. One explanation of the scholarship's influence is that these student responses emerge from intra-household bargaining over HOPE rents in the decision *where* to attend college. It is not uncommon for UGA undergraduates to admit to being "bribed" to forgo an out-of-state or private-school alternative with an offer of a car. This anecdotal evidence is supported by Cornwell and Mustard (2004), who find that car registrations in high-income counties rise almost 1% for each 10% increase in the number HOPE recipients attending a public college or university.

To what extent can these results be generalized to other state-sponsored merit scholarships? The answer depends on how HOPE-like they are. At least two characteristics of Georgia's program are key in this regard. First, the award is earned and retained solely through meeting specified (mostly grade-based) academic criteria. Second, there is no fixed time period (e.g., eight semesters) for scholarship qualifiers to use their awards. Many of programs started in the mid-1990s have these characteristics, although the newest of the scholarships have limits on the number of semesters or academic years they can be used. Finally, because UGA is a flagship institution and virtually every first-year student qualifies for the award, the magnitude of the effects may differ from lower-tier institutions where smaller fractions of students qualify.

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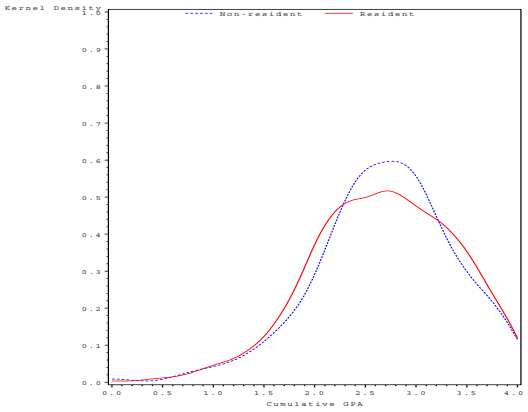
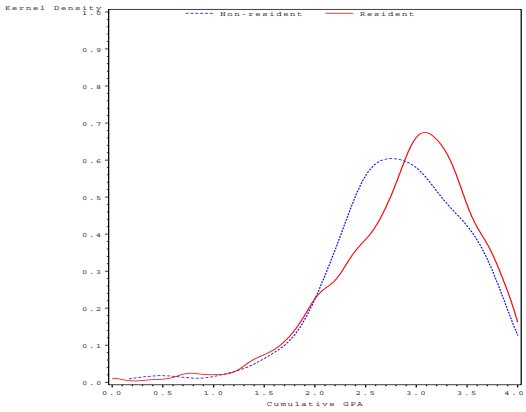
Figure 1

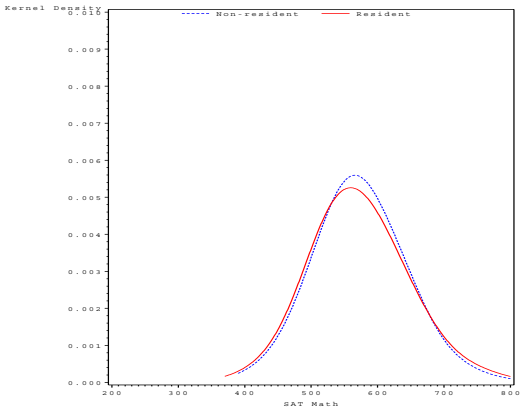
Kernel Density Plots of Cumulative GPA (CGPA) and SAT Math and Verbal Scores, Typical First-Year Residents vs. Non-residents, 1992 and 95 Classes



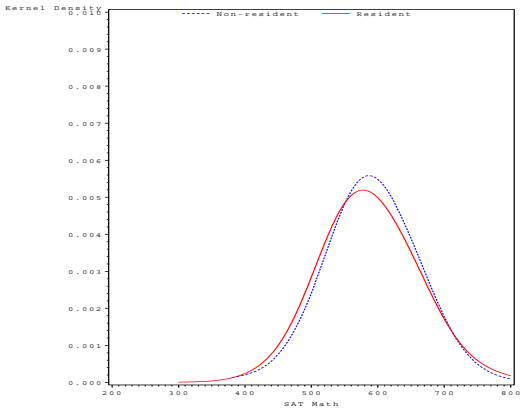
(a) CGPA: 1992 Class



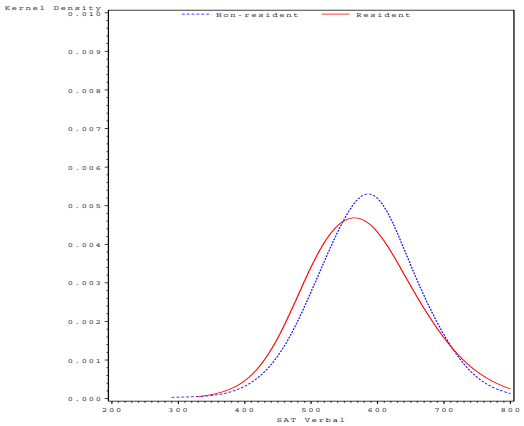
(b) CGPA: 1995 Class



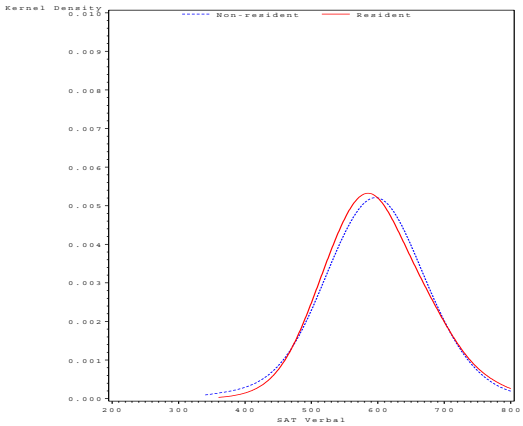
(c) SAT Math: 1992 Class



(d) SAT Math: 1995 Class



(e) SAT Verbal: 1992 Class



(f) SAT Verbal: 1995 Class

Figure 2
Percentage of Typical FTF Enrolling in a Full Load

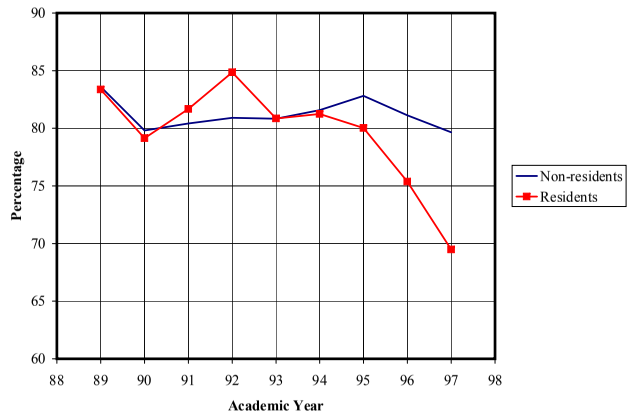


Figure 3
Percentage of Typical FTF Withdrawing from a Course

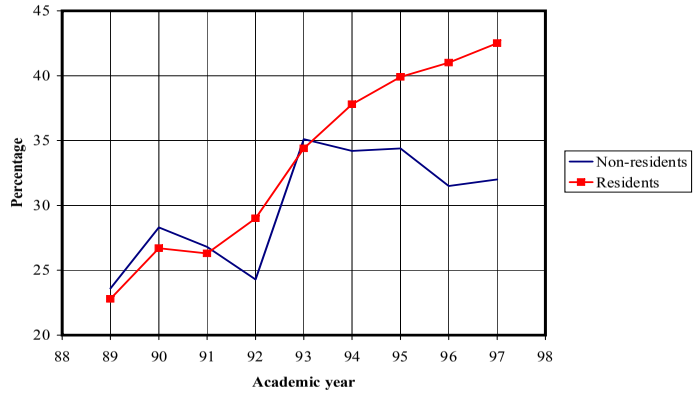


Figure 4
Percentage of Typical FTF Completing a Full Load

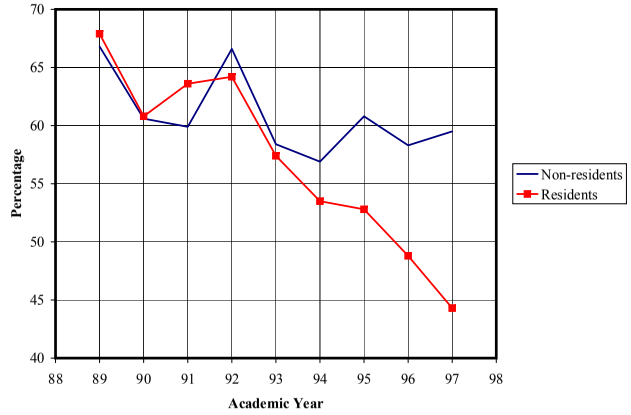


Figure 5
Mean Credit Hours Completed in the First Summer Term

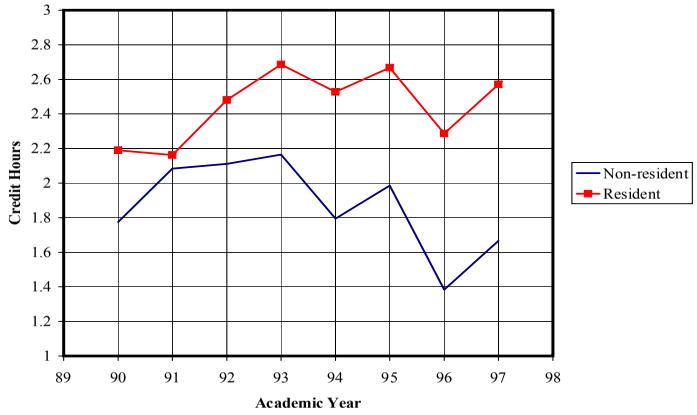


Table 1
Sample Means for Typical First-Year Students[a]
(Standard Deviations in Parentheses)

	Pre-HOPE (1989-92)		Post-HOPE (1993-97)	
Variable	Non-resident	Resident	Non-resident	Resident
Full-Load Enrollment Rate[b]	81.2	82.2	81.2	77.0
Withdrawal Rate[c]	25.7	26.1	33.7	39.4
Full-Load Completion Rate[d]	63.5	64.2	58.8	50.9
Credit Hours Enrolled	43.65	44.22	44.10	44.25
	(7.13)	(6.22)	(6.95)	(5.86)
Credit Hours Withdrawn	1.61	1.57	2.10	2.53
	(3.29)	(3.18)	(3.66)	(3.92)
Credit Hours Completed[e]	42.04	42.65	42.00	41.71
	(8.00)	(7.22)	(7.84)	(7.33)
High-School GPA	2.99	3.12	3.21	3.40
	(0.45)	(0.51)	(0.43)	(0.42)
SAT Math Score	564.51	559.78	585.17	582.40
	(64.06)	(67.93)	(65.80)	(69.38)
SAT Verbal Score	574.01	565.92	592.70	589.22
	(73.63)	(77.26)	(73.21)	(71.74)
SAT Total Score	1138.52	1125.70	1177.88	1171.62
	(113.63)	(124.78)	(117.89)	(120.98)
AP Credit Hours Earned	3.27	2.77	5.24	4.55
	(6.10)	(6.01)	(8.38)	(8.15)

[a] "Typical students" refers to those who matriculate at UGA in the fall term of the same year as they graduate from high school.

[b] Percentage of typical first-year students enrolling in a full-course load.

[c] Percentage of typical first-year students withdrawing from a class.

[d] Percentage of typical first-year students completing a full-course load.

[e] Credit hours completed = credit hours enrolled − credit hours withdrawn.

Table 2
Estimated HOPE Effect on
Pre-College and First-Year Course-Taking Outcomes
Typical First-Year Students, 1989-97 [a]

Outcomes	Coefficient (s.e.) on $GA \cdot H$ [f]	R^2	N
A. Pre-College Outcomes			
SAT Math Score	1.502 (2.307)	0.256	30,784
SAT Verbal Score	9.305 (2.700)	0.193	30,784
High-School GPA	0.065 (0.016)	0.289	31,021
AP Credits	-0.013 (0.281)	0.148	31,116
B. First-Year Course-Taking Outcomes: Extensive Margin			
Full-Load Enrollment[b]	-0.042 (0.016)	0.094	31,115
Course Withdrawal[c]	0.042 (0.018)	0.099	31,115
Full-Load Completion[d]	-0.060 (0.019)	0.108	31,115
C. First-Year Course-Taking Outcomes: Intensive Margin			
Credits Enrolled	-0.474 (0.267)	0.110	31,115
Credits Withdrawn	0.441 (0.140)	0.103	31,115
Credits Completed[e]	-0.915 (0.306)	0.109	31,115

[a] Heteroscedasticity-consistent standard errors reported.

[b] Probability that a student enrolls in a full load in the first year; $y_{it} = 1$ if credits enrolled ≥ 45.

[c] Probability that a student withdraws from a course in the first year; $y_{it} = 1$ if credits withdrawn > 0.

[d] Probability that a student completes a full load in the first year; $y_{it} = 1$ if credits completed ≥ 45.

[e] Credits completed = credits enrolled − credits withdrawn.

[f] Each outcome regression includes control variables for race, gender, class year, and high school attended.

Table 3
Estimated HOPE Effect on
Course Enrollment, Withdrawal and Completion
by Predicted GPA Category
Typical First-Year Students, 1989-97 [a]

Outcomes	Predicted GPA[b]	Coefficient (s.e.) on $GA \cdot H$ [g]	R^2	N
A. Extensive Margin				
Full-Load Enrollment[c]	< 2.7	-0.058 (0.022)	0.114	18,653
	2.7-3.3	-0.084 (0.038)	0.154	7,092
	≥ 3.3	0.040 (0.033)	0.156	4,958
Course Withdrawal[d]	< 2.7	0.112 (0.026)	0.125	18,653
	2.7-3.3	0.021 (0.044)	0.151	7,092
	≥ 3.3	-0.051 (0.041)	0.146	4,958
Full-Load Completion[e]	< 2.7	-0.120 (0.027)	0.130	18,653
	2.7-3.3	-0.084 (0.047)	0.172	7,092
	≥ 3.3	0.077 (0.044)	0.161	4,958
B. Intensive Margin				
Credit Hours Enrolled	< 2.7	-0.654 (0.361)	0.132	18,653
	2.7-3.3	-0.643 (0.686)	0.150	7,092
	≥ 3.3	0.497 (0.655)	0.180	4,958
Credit Hours Withdrawn	< 2.7	0.920 (0.203)	0.134	18,653
	2.7-3.3	0.144 (0.315)	0.143	7,092
	≥ 3.3	-0.202 (0.261)	0.145	4,958
Credit Hours Completed[f]	< 2.7	-1.573 (0.419)	0.135	18,653
	2.7-3.3	-0.787 (0.764)	0.156	7,092
	≥ 3.3	0.700 (0.704)	0.171	4,958

[a] Heteroscedasticity-consistent standard errors in reported.

[b] GPA category predictions were obtained from an ordered probit model estimated with the pre-HOPE data. See Lee (2004) for details.

[c] Probability that a student enrolls in a full load in the first year;
$y_{it} = 1$ if credits enrolled ≥ 45.

[d] Probability that a student withdraws from a course in the first year;
$y_{it} = 1$ if credits withdrawn > 0.

[e] Probability that a student completes a full load in the first year;
$y_{it} = 1$ if credits completed ≥ 45.

[f] Credit hours completed = credit hours enrolled − credit hours withdrawn.

[g] Each outcome regression includes control variables for race, gender, class year, and high school attended.

Table 4
Estimated HOPE Effect on
Intertemporal Substitution and Summer-School Course Taking[a]

Outcomes	Year/Summer in School	Coefficient (s.e.) on $GA \cdot H$ [f]	R^2	N
A. Intertemporal Substitution (1989-97 Classes)				
Full-Load Completion[b]	1st Year	-0.060 (0.019)	0.108	31,115
	2nd Year	0.017 (0.023)	0.103	23,922
	3rd Year	-0.010 (0.025)	0.109	18,981
	4th Year	-0.020 (0.031)	0.108	14,755
Credit Hours Completed[c]	1st Year	-0.915 (0.306)	0.109	31,115
	2nd Year	0.479 (0.455)	0.120	23,922
	3rd Year	0.524 (0.561)	0.122	18,981
	4th Year	0.385 (0.717)	0.115	14,755
B. Intertemporal Substitution (1990 and 95 Classes)				
Full-Load Completion	1st Year	-0.065 (0.046)	0.168	7,081
	2nd Year	0.053 (0.055)	0.162	6,304
	3rd Year	-0.013 (0.056)	0.165	5,770
Credit Hours Completed	1st Year	-1.520 (0.666)	0.198	7,081
	2nd Year	2.054 (1.038)	0.181	6,304
	3rd Year	0.931 (1.282)	0.191	5,770
C. Summer-School Course Taking (1990 and 95 Classes)				
Summer Course Enrollment[d]	1st Summer	0.071 (0.045)	0.175	6,304
	2nd Summer	0.037 (0.055)	0.172	5,770
	3rd Summer	0.020 (0.059)	0.165	5,602
Summer Credits Completed[e]	1st Summer	1.440 (0.443)	0.178	6,304
	2nd Summer	1.042 (0.559)	0.171	5,770
	3rd Summer	-0.169 (0.643)	0.176	5,602

[a] Heteroscedasticity-consistent standard errors reported.

[b] $y_{it} = 1$ if credits taken in the t-th school year ≥ 45.

[c] Credit hours taken = credit hours enrolled - credit hours withdrawn.

[d] $y_{it} = 1$ if credits taken in the summer of the t-th school year > 0.

[e] Summer credits taken = summer credits enrolled - summer credits withdrawn.

[f] Each outcome regression includes control variables for race, gender, class year, and high school attended.