

PROGRAM NARRATIVE

“Keeping HOPE Alive: An Economic Analysis of Georgia's Lottery-Funded Scholarship Program”

I. Introduction and Literature Review

The proposal's objective is to study the economic effects of Georgia's HOPE Scholarship, with particular attention to individual behavioral responses to the program's incentives. The proposal sets forth a long-term research agenda to address three categories of questions: What student, family, and school characteristics are related to scholarship retention? How and to what extent does HOPE affect college enrollment decisions? How and to what extent do the HOPE incentives affect students' academic choices during their college careers?

In September 1993, Georgia instituted a lottery-funded college scholarship for the purpose of “Helping Outstanding Pupils Educationally” (HOPE). Since then, over \$750 million has been distributed to over 420,000 students through the HOPE Scholarship. The large number of students and amount of money awarded make it one of the largest educational scholarships in the US. The primary goals of the scholarship were to ensure that Georgia's best high-school students could afford college, and to give them a greater incentive to attend in-state institutions.

The HOPE Scholarship is one of the most innovative post-secondary educational reforms in recent decades. Two important features of the program are that it is entirely merit-based and has no income cap.¹ To qualify for the scholarship, high-school students must graduate with a “B” average.² Once in college, they must maintain a “B” average with a minimum number of credits to retain the award. The scholarship pays the entire tuition, fees and book expenses of Georgia citizens who attend state universities. Qualified students enrolling in private colleges or universities in Georgia receive a fixed payment comparable to the size of the benefit awarded to those attending public institutions. For the 1998-99 academic year, the value of a HOPE award was about \$3300.

The HOPE Scholarship is funded entirely by revenue from the Georgia lottery,³ administered by the Georgia Lottery Corporation. This corporation is legally required to allocate 51 percent of its revenues to players in winnings and 35 percent of its revenue to education. The remaining 14 percent is split between retailers and operating expenses. Since their joint inception, the Lottery Corporation and HOPE Scholarship have transferred hundreds of millions of dollars from lottery players to college students.

This scholarship has been received very favorably both within and outside

¹ When the HOPE Scholarship was implemented there was an income cap of \$66,000. The cap was subsequently raised to \$100,000, and later eliminated completely.

² HOPE requirements will change for high-school classes that graduate in 2000 and later. To receive HOPE members of those classes must have a “B” average in their core college preparatory courses.

³ In addition to the HOPE Scholarship, the Georgia Lottery for Education Act specifies that proceeds from lottery sales be used to fund capital outlay projects for educational facilities and voluntary prekindergarten programs that provide limited early intervention services to children and families through 941 licensed child-care learning centers.

Georgia, and has generated extensive national attention (Zapler 1994, Healy 1995, Appleborne 1996, Healy 1997). President Clinton designated Georgia's HOPE Scholarship as the model for the federal HOPE tuition tax credit. Furthermore, the popularity of Georgia's program led to the passage of similar lottery-funded scholarships in Kentucky, New Mexico and Texas. Other states (Alabama, South Carolina and Tennessee) have recently held votes to amend their constitutions to implement the passage of a Georgia-style scholarship program. The institution of a Georgia-style scholarship was the primary issue in the 1998 Alabama and South Carolina gubernatorial elections. In both states, Democratic challengers who supported a lottery-funded scholarship based on the Georgia model upset Republicans who opposed the idea. These states were the only two in which Republican gubernatorial incumbents lost.

Despite the popular acceptance of a lottery-funded scholarship, HOPE has been criticized. An *Atlanta Journal-Constitution* editorial raised the question of rent-seeking: "The whole idea of the HOPE program is to make college possible for those who otherwise might not be able to afford it ... Instead, it is a handout to upper middle-class families [who] might even express their thanks at the ballot box next fall."⁴ Some are troubled because HOPE funds substitute dollar-for-dollar for need-based aid such as Pell Grants. Tolly Nagy, Financial Aid Director at Georgia Southern University, said, "If you're going to talk about needy people, the HOPE grant is not well designed for serving them, but I don't think that was ever the intention."⁵ Then-governor Zell Miller explained the program's goal: "This is not about family income. It's saying to a kid and student that if you are responsible and you keep a B average, you will have the opportunity to go to college."⁶

For its size and scope, the attempts by many states to replicate it, and the important issues raised by its critics, the HOPE Scholarship has been subjected to surprisingly little rigorous empirical analysis. Curran (1998) studied a self-selected sample of 131 HOPE recipients and 107 non-recipients from the University of Georgia (UGA). She concluded that HOPE motivated capable students to work harder, made them more likely to remain in-state for their post-secondary education, and led them to be more grade conscious than their non-recipient counterparts. Dee (1998), using data from the Augusta-Aiken, Chattanooga and Columbus Metropolitan areas, provided some evidence that the HOPE Scholarship increased the volume and value of new single-family residential construction in Georgia. The studies by the state's Council for School Performance (Bugler and Henry 1997 and 1998; David, Hall and Henry 1995) stopped well short of formal econometric modeling and limited their attention to basic trends and summary statistics of the data. For example, they have compared the average GPA and persistence in college by HOPE and non-HOPE students, and have disaggregated these statistics by race. To fill the research gap on this issue of significant academic and public interest, we will conduct the first large-scale empirical examination of the effects of Georgia's HOPE Scholarship.

⁴ *Atlanta Journal Constitution*, December 2, 1993.

⁵ Healy, Patrick, "HOPE Scholarships Transform the University of Georgia." *The Chronicle of Higher Education*, November 7, 1997.

⁶ Zell Miller, State of the State address, 1993.

II. Overview of Research Plan

Georgia's experiment with the HOPE Scholarship affords a unique opportunity to learn how merit-based financial aid programs impact higher education. Because little serious research has been devoted to the program, our long-term research agenda will address many economically interesting and policy-relevant issues. An overview of the long-term plan lists three broad categories of research:

- A. Losing HOPE
 - 1. How important is high-school achievement for scholarship retention?
 - 2. Conditional on high-school achievement, what other student, family, and school characteristics predict HOPE loss?
 - 3. Has the prospect of HOPE loss affected students' choices of majors?
- B. Enrollment Effects
 - 1. How and to what extent has HOPE increased access to post-secondary education?
 - a. Has HOPE led to increases in post-secondary enrollments?
 - b. Has HOPE raised the enrollments of African Americans?
 - 2. How and to what extent has HOPE affected students' choices of post-secondary institutions?
 - a. Has HOPE induced more students to remain in Georgia for their post-secondary education?
 - b. Has HOPE altered the distribution of students between public and private post-secondary schools within Georgia?
- C. Effects on Behavior at College
 - 1. How and to what extent has HOPE influenced curriculum choice.
 - a. Has HOPE affected the choice of major field of study?
 - b. Has HOPE led to more grade-centered strategic behavior, such as withdrawing from courses and fulfilling certain curriculum requirements through other institutions?
 - 2. Has HOPE increased student effort and academic performance?

As the first large-scale, lottery-funded scholarship program based on merit, HOPE raises many questions that cannot be feasibly addressed in this project. In defining the boundaries of this proposal, we have settled on those issues deemed most important, subject to the constraints imposed by the available data. In the last section, we sketch some of the possibilities for expanding this research agenda in the future.

To date, our work on the HOPE Scholarship has dealt with two issues that are related to the research questions of this proposal. One concerns the nature of the transfer created by the program. On the revenue side, our preliminary results are consistent with the extensive lottery literature (for example, Clotfelter and Cook (1989), and, more recently, the National Gambling Impact Study Commission (1999)), concluding that low-income, poorly educated minorities play the lottery at a disproportionately higher rate than other groups. Regarding expenditures, we find HOPE scholarships are allocated more frequently to counties with a larger share of high-income, white residents. Consequently, the disbursements exacerbate the effects of the transfers from the revenue-

generating stage.

The other involves the rent component of HOPE payments. Since eligibility requires a “B” average in high school, many students who qualify for HOPE probably planned to attend college anyway. Studies on the distributional effects of merit-based financial aid extend back to Hansen and Weisbrod (1969), and more recently include more Heckman, Lochner and Taber (1998) and McPherson and Schapiro (1998). Cornwell, Mostoller, and Mustard (1999) contribute to this literature by examining the relationship between consumption—as proxied by automobile registrations—to the incidence of the scholarship. While HOPE payments that are infra-marginal to the college enrollment decision are obviously available for consumption in general, we focus on the automobile component of consumption for two reasons. First, automobile demand is readily observed from year to year in registration and ad-valorem tax data. Second, the relatively swift passage of the lottery law and establishment of the program created an unanticipated windfall large enough to allow consumer durables purchases, such as automobiles, to be financed out of household savings targeted for college. We conclude that there is a significant and sizeable HOPE effect on automobile demand. HOPE incidence is associated with larger sums spent on a given car, which is most pronounced in counties with the highest per-capita income. Furthermore, increases in car registrations and values are extremely pronounced in the first year after HOPE and taper off thereafter, which supports the contention that the passage of HOPE was unexpected, and gave families access to an unanticipated source of funds. Once the scholarship money became available, it appears as though students and parents factored this information into their consumption and savings decisions prior to college enrollment.

Sections III, IV and V develop our specific research plans for parts A, B and C, respectively, of the above outline. Section VI discusses the policy implications of the proposal, and Section VII presents a strategy for disseminating the results.

III. Losing HOPE

Introduction

Some of the most fundamental questions about HOPE involve factors that influence whether a student remains eligible for the scholarship. Given the importance that college admission criteria place on high-school grade-point average (HSGPA) and scores on standardized tests like the Scholastic Aptitude Test (SAT), we expect these measures of pre-college academic achievement to be significant predictors of HOPE loss. However, HSGPAs and SAT scores likely confound the effects of other student, family, and school characteristics.

Consider the role of race. While more than half of all students fail to meet the standards for retaining the scholarship, African Americans are much less likely to maintain eligibility. As reported in the *Chronicle of Higher Education* article cited earlier, only 22 percent of black freshman recipients keep their scholarships through their junior years, while 49 percent of whites retain them. How much of the black-white gap in scholarship retention can be explained by pre-college achievement? Recent work by Betts and Morell (1999) suggests that race matters little in the determination of college GPA,

conditional on HSGPA and SAT scores.⁷ The direct implication of this result is that discrimination does not play an important role in the academic evaluation of college students. This might be comforting at some level, but it also begs the question: what determines high-school achievement? To what extent can the “returns” to HSGPA and SAT scores be accounted for by other student characteristics, family background, and school quality? There is also the separate question of how much of the variance in college GPA can be explained by HSGPA and SAT scores. Betts and Morell conclude that the answer is only 28 percent.

In our analysis of HOPE loss, we will attempt to distinguish the effects of HSGPA and SAT scores from those associated with other student, family, and school characteristics. For example, we will be able to test the significance of such factors as hours worked and hours spent in extra-curricular activities during high school, parents’ education, and the proportion of a high school’s population qualifying for a free lunch.

Data

Our examination of the questions related to HOPE eligibility will be based on a dataset containing a longitudinal record of every undergraduate who enrolled at the University of Georgia between 1988 and 1998. Each student record will include information from three sources: the Office of Student Financial Aid, the Undergraduate Admissions Office, and the Carl Vinson Institute of Government. The Office of Student Financial Aid provided the HOPE status of each undergraduate, amount of other financial aid (if any), and reason for losing HOPE (if applicable).⁸ From the Undergraduate Admissions Office we obtained an extensive range of individual pre-college characteristics, including HSGPA, SAT scores, curriculum difficulty, labor-market hours, hours spent in extra-curricular activities, race, gender, and family characteristics such as parents’ education. Measures of school quality like the proportion of the population qualifying for a free lunch, dropout rate, and teacher-pupil ratio are compiled annually by the Institute of Government. The final dataset will be comprised of almost 50,000 individuals, each observed for every quarter enrolled at the university. Of course, for the HOPE loss project, the focus will be on those individuals who matriculated since the scholarship program began.

Data involving the kind of personal information listed above naturally raise privacy concerns. The University of Georgia Legal Affairs Office has granted us permission to use student-record data, and has worked with us to ensure that our use will be in full compliance with the Family Educational Rights and Privacy Act (FERPA).

⁷ Betts and Morell’s findings are based on a sample of 5000 undergraduates who entered the University of California-San Diego between the fall of 1991 and the fall of 1993. Aside from Raymond (1968), theirs is the only study to have examined how high-school characteristics influence college GPA. By way of analyzing the pre-college factors affecting HOPE status, our proposed research, which will exploit a much larger and richer data set, should represent a significant contribution to the literature on post-secondary academic achievement.

⁸ Since the elimination of the income cap after the second year of the program, virtually every in-state student admitted to the University of Georgia begins his college career as a HOPE recipient.

Empirics

There are two primary components to our empirical strategy. The first concentrates on the pre-college factors related to scholarship retention and primarily involves estimating probit models of the form

$$L_i = X_i' \beta_X + F_i' \beta_F + S_i' \beta_S + C_i' \beta_C + \varepsilon_i \quad (1)$$

where $L_i = 1$ if a student i ($i = 1, \dots, N$) loses the scholarship, F_i is a vector of family background variables and S_i is a vector of school characteristics. C_i contains dummy variables to account for class-year effects and ε_i represents statistical noise.

Models like (1) can be estimated as straightforward logit or probit regressions, given that all of the explanatory variables can be treated as exogenous with respect to the probability of HOPE loss. Estimation will be based on those students who enrolled between the fall of 1993 and the fall of 1995. Observations on enrollees from later classes are censored in the sense that these individuals have not had the usual four years to complete their degrees. Since students matriculating after the 1995 fall quarter have not had the same opportunity to lose HOPE as those entering before, including them would bias the results.

In addition to the probability of losing HOPE, we are also concerned about the length of time (number of academic quarters) a student remains eligible. To address this question, we will also estimate log-duration models of HOPE eligibility, using the same set of covariates as in (1) and restricting the analysis to students with completed spells. With this setup—fixed covariates and completed spells—the traditional exponential, Weibull, and log-logistic specifications can be treated as special cases.

While understanding the role pre-college factors play in scholarship retention is important, behavioral responses to the likelihood of scholarship loss are also of interest. For example, having established eligibility for HOPE in high school, students might be influenced in their choices of college degree programs by the cost of maintaining a qualifying GPA in a given field of study.⁹ If so, students may be trading off lifetime earnings to retain the scholarship. Thus, the second component of our empirical strategy extends the analysis beyond the reduced form depicted in (1) by introducing a separate equation for the student's choice of major that recognizes the potential dependency of that choice on the probability of HOPE loss.¹⁰ The traditional foundation for such an equation is a random utility model, which we might express as

$$U_{ij} = \gamma_{ij}^* + R_{ij}' \beta_R + \varepsilon_{ij}, \quad (2)$$

⁹ Betts and Morell consider the influence of a student's major field on college GPA by including dummy variables for five broad categories of majors (engineering, science, arts, humanities, and social science). However, they assume the choice of field is exogenous.

¹⁰ Through data provided by the University of Georgia's Registrar's Office, we are able to construct each student's complete collegiate academic record, which, of course, includes major field of study. These data are described in more detail in section V.

where U_{ij} is the utility derived from choice j ($j = 1, \dots, J$), L_{ij}^* is the (latent) probability of HOPE loss, and R_{ij} is a set of variables summarizing the net returns to a particular field of study.

The empirical counterpart to (2) involves estimating $\Pr(M_i = j)$, where M_i is an indicator variable of the student's major. Aside from dealing with the endogeneity of L_{ij}^* , the important econometric issue is how to specify this probability. Even if J were defined in terms of the primary colleges within the university, the number of choices would still be large enough to make a multivariate probit approach computationally burdensome. Thus, we will consider nested logit and heteroscedastic extreme-value models for $\Pr(M_i = j)$, avoiding the independence of irrelevant alternatives (IIA) restrictions imposed by the simpler conditional logit.

IV. Enrollment Effects

Introduction

The original goals of the HOPE Scholarship had both access and choice components. HOPE was instituted to make it possible for all of Georgia's high-achieving students to go to college and to give them a greater incentive to attend an *in-state* institution. This part of our project will focus on the questions related to HOPE's influence on college enrollments, both from an access and choice perspective. The primary access question is simple: has HOPE increased college attendance? Also important is whether HOPE affected the racial composition of enrollments, given that African Americans are less likely to be able to afford college. The choice questions relate to whether HOPE has affected college destinations. To what extent has HOPE influenced students to remain in Georgia for their post-secondary education? Has HOPE altered the distribution of students between public and private post-secondary institutions within Georgia?

Attempts to address these questions should begin with some understanding of how HOPE has affected the price of higher education in Georgia. As stated at the outset, the scholarship pays the tuition, fees and book expenses of state citizens who enroll in Georgia public institutions. Qualified state residents enrolling in Georgia private colleges or universities receive a fixed payment comparable to the size of the subsidy to public institutions, which was roughly \$3300 for the 1998-99 academic year. Thus, ignoring the costs of room and board, for qualified students HOPE has reduced the price of an in-state public institution to zero, and the prices of in-state private colleges and universities by \$3300, making both destinations more accessible.

Using data from the National Longitudinal Survey of Youth (NLSY), Cameron and Heckman (1999) show that the effect of family income on college attendance is greatly weakened when they account for a student's cognitive ability (as measured by AFQT score) and family background (parental education). In other words, the primary contribution of family income is in preparing a child to attend college, not financing college expenditures. The main conclusion Cameron and Heckman draw from their findings is that efforts to increase college attendance might be more effective if

concentrated on motivating students to graduate from high school and acquire the necessary skills to succeed in college, rather than on purely need-based tuition subsidies like Pell Grants. Since HOPE is merit-based, it may serve to motivate some students to prepare for college who would not otherwise. To the degree African Americans respond to this incentive, HOPE could possibly operate to reduce the black-white gap in educational attainment.

The other effect of the HOPE subsidy has been to change the relative prices of in-state destinations. In particular, the scholarship program has lowered the price of in-state-public institutions relative to both in-state-private and out-of-state schools, and decreased the price of in-state-private relative to out-of-state institutions. Given these relative price changes, we expect to find an increase in the number of Georgia students attending in-state-public schools and a decrease in the number of Georgia students enrolling in out-of-state institutions. The effect on in-state-private college enrollment is less clear, because it would depend on the number of students on the in-state, public-private margin relative to the in-state-private–out-of-state margin.

Brewer, Eide, and Ehrenberg (1998, 1999) present strong evidence that the return to attending an elite private college is large and has increased in recent years. Hence, the potential effects of HOPE on college destinations raise the question of whether the HOPE “bribe” is sufficient to compensate for any reduction in lifetime earnings and opportunities students might experience by foregoing out-of-state or private alternatives.

Data

Our analysis of the access question will be based on two panel datasets. One combines aggregate data on head counts, tuition, and demographic characteristics from Georgia with the same data from other states in the region, where the region is defined by the member states of the Southern Regional Education Board (SREB).¹¹ The other contains annual enrollment and tuition data for each of 34 Georgia public institutions from 1985 to 1998. Since enrollments are broken down by race and school type (2-year college, 4-year college, or university), we will be able to test whether HOPE’s impact has varied across these categories. As discussed below, the cross-state data provide a natural experiment for examining differences in differences. The data on Georgia colleges and universities will facilitate traditional head-count regressions in the spirit of studies such as Corazzini, et al. (1972) and Lehr and Newton (1978).¹²

To address the choice questions, we will first utilize data from out-of-state and private schools to estimate enrollment regressions that examine both the in-state–out-of-state and the in-state, public-private choices.¹³ Figure 1, which depicts enrollment trends

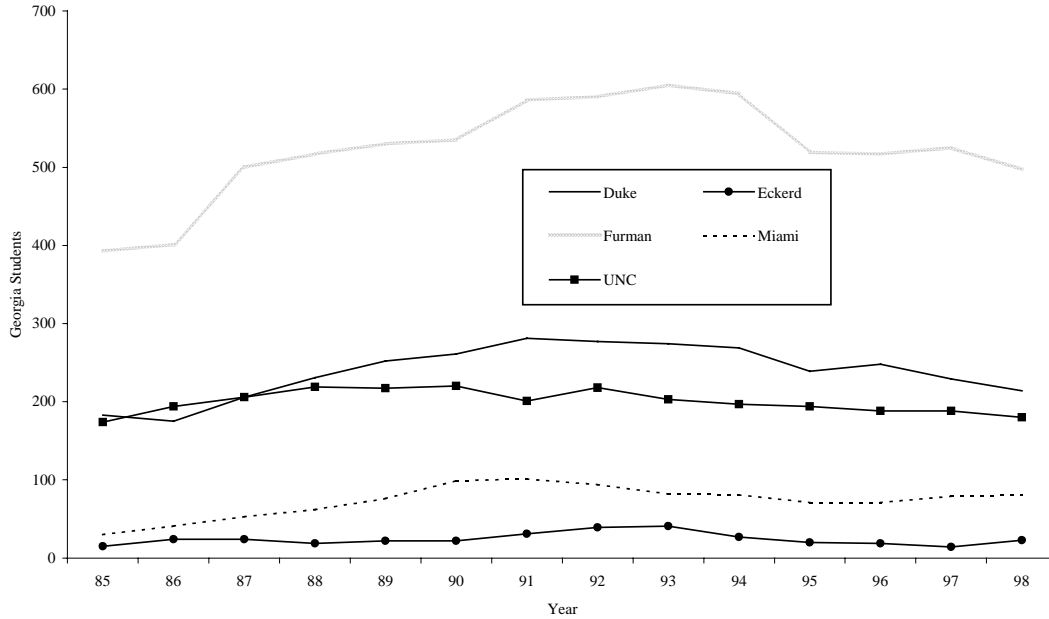
¹¹ The sixteen SREB member states are Alabama, Arkansas, Delaware, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia and West Virginia. Delaware joined the SREB in 1998 and is excluded from our sample.

¹² See McPherson and Schapiro (1993) for a thorough review of college enrollment studies focusing on the role of financial aid.

¹³ To date, we have collected data on Georgia enrollments in over 20 out-of-state and private institutions. This group includes, in addition to those schools listed in Figure 1, Alabama, Auburn, Davidson (NC), Florida State, Samford (AL), South Carolina, and Wake Forest. Ultimately, our sample will include all of the important peer institutions that compete with Georgia’s 4-year colleges and universities.

of Georgia high-school students in five popular out-of-state destinations, gives some indication of the effect of HOPE along the in-state–out-of-state margin. In each case, enrollments generally rise until 1993, when the HOPE program begins, and fall thereafter. In particular, between 1985 and 1992 the number of Georgia students rose by over 200 percent at Miami, 150 percent at Eckerd, 50 percent at Duke, 50 percent at

Figure 1: Georgia Students Enrolled in Out-of-state Institutions



Furman and 25 percent at UNC. These increases were spurred in large part by rapid growth in high-school-age students and per capita income in Georgia. While this growth has continued throughout the 1990s, between 1992 and 1998 the number of Georgia students enrolled at these institutions fell by over 13 percent, 40 percent, 22 percent, 15 percent, and 17 percent, respectively.

Ideally, the choice questions should be addressed in terms of data on *individuals*. To this end, we will also use the survey data annually collected by the Office of Undergraduate Admissions through its “Admitted Student Questionnaire”. The survey asks students to compare the University of Georgia to other schools that admitted them in terms of price, academic programs, reputation, facilities, and various amenities. While these data raise obvious questions about non-response bias, the information gathered in the application process should allow us to account for the survey-response process.

Empirics

Perhaps the most potentially compelling strategy for investigating whether HOPE has expanded access to post-secondary education is to exploit the natural experiment feature of the cross-state data. Viewing the implementation of Georgia’s scholarship program against the backdrop of enrollment trends among all SREB institutions leads to an analysis of differences in differences. In a regression context, we are interested in the coefficient of an interaction between a HOPE dummy variable and a Georgia state

dummy, say $\delta_{GA,t}$ in an expression like

$$E_{it} = \alpha + \beta_i S_i + \gamma_t H_t + \delta_{it} S_i H_t + \varepsilon_{it}, \quad (3)$$

where E_{it} is the fraction of the eligible population (high-school graduates aged 18-25) enrolled in state i in year t , S_i is a state dummy variable, and H_t is a HOPE indicator which equals 1 in year t and 0 otherwise, $t = 1993, 94, \dots$. The structure of (3) subsumes the simplest case, captured solely by the $\delta_{GA,t}$, which involves the contrast between Georgia and the other SREB states as a whole. More generally, (3) allows us to compare Georgia with the other SREB states individually by examining the estimated value of the $\delta_{GA,t}$ relative to the δ_{it} , $i \neq GA$. Obviously, (3) can be extended to include other covariates, such as household income, that may influence enrollments.

Note that we allow the HOPE effect to vary over time. This is important, since uncertainty about the lottery's passage into law may have limited HOPE's impact on college attendance early on. Later, however, as it became clear that the scholarship and the basic rules for eligibility were fixed, we are more likely to observe enrollments rising because of HOPE.

In addition to testing the significance of differences in differences, we will use the enrollment data from the 34 Georgia public colleges and universities to estimate HOPE's effect at the institutional level. This will involve regression specifications typical of head-count studies, which relate the enrollment variable to own price, the price of alternatives, income, and local unemployment rates, among other things. As in (3), HOPE's impact will be captured through a set of dummies. The usefulness of this strategy will be greatest where we have the ability to link the local economic environment to enrollments at a particular institution, as is the case for 2-year community colleges and regional 4-year colleges. These institution types together account for the vast majority of all students engaged in public post-secondary education in Georgia.

As suggested by Figure 1, the in-state-out-of-state margin may be an important source of enrollment increases at Georgia's 4-year national universities, consistent with the goals of the scholarship program. At the same time, the drop in students entering from Georgia has not gone unnoticed at these out-of-state schools. Some, like Furman, have responded by discounting tuition to Georgia residents by the value of the HOPE Scholarship. Using data from out-of-state competitors, we will estimate enrollment in these institutions by students from Georgia, E_{it} , conditional the price of the out-of-state school relative to the Georgia alternative (P_{it}^o / P_{it}^{GA}):

$$\ln E_{it} = \alpha + \beta_o \ln(P_{it}^o / P_{it}^{GA}) + \beta_{o,H} \ln(P_{it}^o / P_{it}^{GA}) H_t + \theta_i S_i + \lambda_t Y_t + \varepsilon_{it}, \quad (4)$$

where S_i is defined as in (3), $H_t = 1$ for $t \geq 1993$ and 0 otherwise, and the Y_t are conventional year dummies. Here, our primary interest will be in whether the price elasticity changes with the introduction of HOPE, that is, on the price-HOPE interaction. The estimated year effects (λ_t) will reflect the overall temporal pattern in attendance. We will also apply this framework to the relationship between HOPE and the enrollment

of Georgia citizens in in-state, private colleges and universities.

These enrollment regressions will be complemented by an econometric analysis of the factors determining an *individual's* decision to attend the University of Georgia, based on the survey data obtained from Admissions Office. First, we will estimate probit models of the enrollment decision for the pre-HOPE and HOPE periods, contrasting the roles price played. Second, we will exploit a natural experiment created by the weakening and eventual elimination of the original income cap. In the first year of the program, students from families with a household income of more than \$66,000 were ineligible; the next year the cap was raised to \$100,000, and was subsequently dropped completely. These program changes should be observable in the survey responses of students affected by the changes, thereby allowing us to identify the HOPE effect.

Since the response rate is not 100 percent,¹⁴ and the responders are almost certainly not a random sample of all admitted applicants, any empirics based on the survey data must account for the selection problems arising from non-response. As previously suggested, data on student characteristics obtained in the application process should allow us to specify a reduced form for the survey-response process.

V. Effects on Behavior at College

Introduction

The third component of our proposed project is concerned with how the incentives of the HOPE program influence a student's academic choices. In dealing with this question, we distinguish between curriculum-related choices and choices related to academic performance. Earlier, in section III, we considered the possibility that the prospect of losing eligibility might enter a student's decision-making calculus regarding a major field of study. Other eligibility-enhancing strategies include withdrawing from a course early and taking particular courses at other (less selective) institutions and transferring the credits. The data suggest that course withdrawals and transferred credits in calculus, statistics, and entry-level science courses have risen at the University of Georgia since HOPE began. Here, we will further investigate HOPE's role in the choice of major, and extend the analysis to the scholarship's effect on course withdrawals and the fulfillment of core-curriculum requirements. As we have noted, to the extent that individual responses to program incentives trade off curriculum difficulty for scholarship eligibility, and the more challenging curricula are associated with higher wages, lifetime earnings may suffer.

The counterpart to the incentive for strategic course taking is HOPE's obvious encouragement of academic performance. Given the choice of major and elective courses, a student still must maintain a "B" average to keep the scholarship. If HOPE raises effort so that human-capital acquisition is intensified, the program may lead to higher earnings, given a student's choice of curriculum. Along with our analysis of the curriculum-related choices, we will look for evidence of HOPE's effect on academic achievement.

¹⁴ The typical response rate is 65 percent for students enrolling in UGA and 39 percent for those enrolling elsewhere.

Data

Our approach to the questions related to choice behavior at college will be based on the dataset constructed from the academic records of University of Georgia students described in section III. To the information obtained from the Office of Student Financial Aid, the Undergraduate Admissions Office, and the Carl Vinson Institute of Government, we will add student transcript data provided by the Registrar’s Office. With the latter we will know each student’s declared major, completed courses and course withdrawals at the university, and transfer credits, for each quarter the student is enrolled. As indicated above, when complete, the dataset will include almost 50,000 individuals and contain cohorts whose schooling began and ended prior to HOPE, along with those whose schooling has occurred entirely during the HOPE years. This feature of the data will facilitate many straightforward contrasts of student behavior under the pre-HOPE and HOPE regimes.

Empirics

In section III, we sketched a framework, formalized in equations (1) and (2), for relating eligibility to the choice of major. This framework can also be adapted to course withdrawals and transfer credits. Consider withdrawals, for example. In this case, the empirical specification might be expressed as

$$W_i = \gamma GPA_{i,-1} + X_i' \beta + \varepsilon_i, \quad (5)$$

where W_i indicates a withdrawal by student i in a given quarter, $GPA_{i,-1}$ is the student’s GPA through the previous quarter, and X_i is a vector of exogenous individual characteristics. Since $GPA_{i,-1}$ is predetermined with respect to W_i , a model like (5) is estimable by standard probit methods. The focus, of course, is on the coefficient of $GPA_{i,-1}$ and how it might vary at different points in the grade distribution. Presumably, students closer to the margin of eligibility—say those with GPAs between 2.8 and 3.2—will be more likely to withdraw from a course than contemporaries with GPAs exceeding 3.2 and individuals matriculating prior to HOPE with GPAs in the same range.

An alternative approach is to turn, again, to natural experiments afforded by the data. Previously, we described the opportunity presented by the elimination of the original income cap. Whether we are focused on withdrawals or transferred credits, an analysis of the differences in differences between students who are ineligible because of the cap and those for whom the cap does not bind, should reflect the impact of HOPE on these decisions. Similarly, we will exploit the exclusion of out-of-state students from the program. Since they are ineligible, these students can serve as control group for the (eligible) in-state students when HOPE begins.

The natural experiment methodology will also be useful in determining whether HOPE has raised academic achievement. One strategy involves comparing students who are ineligible because of the income cap or state of residence with eligibles in terms of

deviations from predicted and actual GPA (at the university). Consider these two groups of students entering the university in the first year of the program. Neither would have been influenced by HOPE in high school, but eligibles would be directly affected by HOPE's effort incentives while at college.¹⁵ Thus, systematic differences between actual and predicted GPA (conditional on the choice of major), must be attributable, at least in part, to the scholarship's reward for merit. We expect the greatest impact to be for those whose predicted GPA was close to the eligibility margin.

VI. Policy Implications

As documented by McPherson and Schapiro (1998), an increasing share of aid for post-secondary education is based on merit. This trend has important implications for education policy as it is concerned with expanding access to higher education, equalizing opportunities to attend college, affecting the choice of institution, and promoting individual investment in human capital.

A traditional objective of higher education policy is to improve access. However, a merit-based program like HOPE may hinder the pursuit of this objective. The obvious possibility, touched on earlier, is that HOPE payments are largely rent—transfers to students who would have otherwise gone to college.

A clearly stated goal of the Georgia system institutions, in common with most other colleges and universities, is to attract and retain more minority students. The eligibility requirements for HOPE may work against this goal as well, given that African Americans are less likely to obtain, and more likely to lose, the scholarship. On the other hand, the results from Cameron and Heckman (1999) suggest that, over time, HOPE could begin to narrow the black-white enrollment gap by motivating skill acquisition and preparation for college in middle and high school.

Another goal of the public colleges and universities in Georgia is to keep high-quality students at home. The argument is that by encouraging these individuals to remain in-state, the quality of Georgia post-secondary institutions will rise, and, to the extent they remain in the state after graduation, the quality of the workforce will rise too. Further, increased investments in human capital at the state level should fuel economic growth by attracting complementary productive factors, like physical and financial capital. The counterpoint to the growth argument is the possibility that the HOPE subsidy generates inefficient student-school matches. Based on the evidence supplied by Brewer, Eide, and Ehrenberg (1998 and 1999) on the returns to elite private colleges, high achievers that remain in state may well sacrifice lifetime earnings far in excess of the value of the scholarship.

As merit-based aid has risen, competition for high-quality students has increased. Anecdotal evidence suggests that HOPE has contributed to this competition, both at the institution and state level. Already some public schools outside the state offer Georgia students in-state tuition, while some out-of-state private schools reduce their tuition for Georgia students by an amount equal to the value of the HOPE Scholarship. At the state level, both Alabama and South Carolina are currently planning to introduce Georgia-style

¹⁵ On the other hand, if HOPE's effect on eligibles' achievement is widespread, and ineligibles are concerned about rank, they may raise their effort in response.

lottery-funded, merit-based scholarships.

Finally, although HOPE lowers the cost of higher education to eligible Georgia residents, concern over eligibility could influence educational outcomes. Some students may substitute away from more challenging degree programs or coursework to retain the scholarship. Also troublesome is the behavior of dropping courses after receiving information that leads one to believe that earning a “B” is unlikely. Withdrawals raise the cost of higher education to both the student and institution.

With its inception in 1993, Georgia's HOPE Scholarship has created an ongoing, large-scale experiment for empirically examining these implications. We certainly expect our findings to be of interest to Georgia policymakers, educators and citizens. Beyond Georgia, the understanding of the effects of merit-based aid developed here will provide valuable insight to states that have already adopted, and states considering whether to adopt, a HOPE-style scholarship. Given the trend toward merit-based aid, highlighted in the recently established federal HOPE tax credit, our research should speak to a national audience as well.

VII. Research Dissemination—Graduate Student Research and Timetable

Graduate Student Research

We are committed to integrating graduate students into our research agenda, and have done so already in our preliminary work. Cornwell, Mostoller, and Mustard (1999) is derived from Mostoller's MA thesis. Obviously, NSF funding will facilitate this process.

A graduate student will be fundamental to the success of this project, especially regarding the management of the large and varied datasets we will use. In the course of working with us, we would also expect the student to develop and complete solid dissertation.

In addition, we anticipate the work begun here will be leveraged in many directions, benefiting graduates not directly funded by this research. Numerous possibilities exist: Has HOPE caused grade inflation? How has HOPE affected high-school academic choices? To what degree have HOPE funds substituted for need-based aid? Still another direction is to extend the empirical setting of the University of Georgia to every public institution in the state. This is a monumental, but potentially very fruitful task, which will allow us to consider HOPE's effects across national universities, regional universities, 4-year colleges, and 2-year community colleges. In fact, we have initiated discussions with the Georgia Board of Regents about commencing this task.

Research Dissemination

To obtain scholarly feedback and disseminate the results, we will seek opportunities to present the research at departmental workshops and professional conferences. Currently, we are scheduled to present the Cornwell, Mostoller, and Mustard working paper at the 1999 Southern Economics Association meetings in New Orleans. For the NSF-sponsored research, we will pursue the platforms of the 2001 and

2002 American Economic Association and Society of Labor Economics meetings. Finally, we will submit our findings for peer review. By the summer of 2001, we expect to submit two papers to economics journals, and a third paper by the summer of 2002.

Because of the widespread impact of the HOPE Scholarship on Georgia families, there will be substantial political interest in the results of our study. Already, officials from Georgia and other states have already contacted us about our research. As the project develops, we plan to follow up on these initial inquiries. Once completed, we anticipate our findings will generate numerous occasions for speaking to state policy makers and members of the media.