PROGRAM NARRATIVE

"Merit Aid and Sorting: The Effects of HOPE-Style Scholarships on College Stratification by Ability, Race and Gender"

I. Introduction and Literature Review

This proposal is to renew our NSF Grant that expires in June 2002. The original proposal, reviewed in Section II, was to study the economic effects of merit-based financial aid by examining Georgia's HOPE Scholarship. That initial proposal set 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? This proposal for renewed funding will extend the initial research, focusing on the relationship between merit aid and sorting in higher education.

Until the late 1980s, merit aid represented a relatively small fraction of total student aid, being largely confined to individual institutions' attempts to attract academically proficient students. McPherson and Schapiro (1998) documented the dramatic increase in merit aid since the early 1990s, a trend that has continued unabated since their book was published. The largest and most prominent merit-aid program in the nation was started in September 1993, when Georgia instituted a lottery-funded college scholarship for the purpose of "Helping Outstanding Pupils Educationally" (HOPE). Between its inception and June 2001, over $1.2 billion was distributed to over 525,000 students through HOPE.[1] In size and scope, HOPE is now roughly twice as large as the federal Pell Grant program in Georgia. In 1998-99, over $189 million in scholarship funds were awarded to 141,000 Georgia undergraduates, compared with only $113 million in Pell aid to 62,000 recipients. The original goals of the scholarship were to ensure that Georgia's best high-school graduates could afford college and to provide a greater incentive for students to remain in state for their postsecondary schooling.

The HOPE program distributes two types of awards–the merit-based HOPE Scholarship and the HOPE Grant. Eligibility for the former depends on a student's high-school grade-point average, while the latter applies only to non-degree programs at 2-year and less-than-2-year schools and has no merit requirements. Thus, the incentives related to merit aid do not apply to technical institutions that primarily offer diplomas and certificates.

To qualify for the Scholarship, which pays the tuition, fees and book expenses of Georgia citizens who attend state universities, high-school students must graduate with a "B" average.[2] There is no income cap.[3] For HOPE Scholars in degree-granting public

[1] The cumulative number of HOPE recipients and value of scholarship awards since the program's inception is available from http://www.gsfc.org/gsfc/html_summary_grant_all_cov_H.htm. Because transfer students are duplicated in the number of HOPE recipients, they must be subtracted from the website total to obtain the number of unique recipients.

[2] HOPE requirements have changed for high-school classes that graduated in 2000 and later. To receive HOPE members of these classes must have a "B" average in their core-curriculum courses.

[3] In the first year of the program, there was a household income cap of $66,000. This cap was raised to $100,000 the following year and eliminated entirely thereafter.

institutions, the program covers tuition, HOPE-approved mandatory fees and a book allowance. The value of the award is about $3500 for the 2000-01 academic year. HOPE Scholars in private, degree-granting institutions receive a standard award of $3000 per academic year toward tuition. Once in college, they must maintain a "B" average with a minimum number of credits to retain the award. In contrast, the HOPE Grant is essentially an entitlement; eligibility does not depend on high-school grade-point average. The grant covers tuition and HOPE-approved mandatory fees, and students may receive it for all coursework required by the institution for a program of study leading to a certificate or diploma.

Although cumulative HOPE awards have been evenly divided between scholarships and grants, the former account for nearly 80 percent of all aid disbursed. Just over 72 percent of HOPE Scholars attended 4-year, public institutions, which absorbed 77 percent of all scholarship aid. Another 8.4 percent took their scholarships to 4-year private colleges, which collected 12.5 percent of these funds. Thus, 4-year public and private schools together enrolled over 80 percent of HOPE Scholars, receiving almost 90 percent of all merit-based aid. Further, the share of program resources allocated to the HOPE Scholarship is growing. Between 1993 and 1999, the number of HOPE-eligible high-school graduates rose over 50 percent, from 29,840 to 45,149, and the percentage of high-school graduates satisfying the merit requirements increased from 48 to almost 65. At the same time, the rate of HOPE-eligible high-school graduates enrolling in Georgia institutions jumped from 23 to 70 percent. The dramatic rise in enrollment yield from the scholarship indicates the importance of HOPE's incentive to remain in state. It also suggests the scholarship's potential for increasing the stratification of Georgia colleges by ability, and possibly by race and gender as well.

With students from middle and upper-income households eligible for HOPE, it is not surprising that the program enjoys widespread support. The popular appeal of HOPE has led Georgia's neighboring states, Alabama, Florida, South Carolina and Tennessee, and many others to adopt or propose merit-based scholarships of their own, usually with lottery funding like Georgia.[4] President Clinton designated Georgia's HOPE Scholarship as the model for the federal HOPE tuition tax credit.

Although studies about merit aid extend back to Hansen and Weisbrod (1969) and merit aid has grown rapidly in the last decade, there has been surprisingly little rigorous empirical analysis of merit aid programs. The sparseness in the merit aid literature contrasts sharply to the large literature on the economic effects of need-based aid (see Leslie and Brinkman (1988) for a comprehensive review), One notable exception is Dynarski (2000), who investigates the influence of HOPE on college attendance using data from the 1989-97 October Current Population Surveys (CPS). Her results imply that HOPE raised college-attendance rates of 18–19-year-olds between 7 and 8 percentage points, or roughly 25 percent, with students from higher-income, white families

[4] The list of states adopting merit scholarships based on the HOPE model extend beyond Georgia's neighbors: Kentucky (Educational Excellence Scholarships (introduced in 1998)), Louisiana (Tuition Opportunity Program for Students (1997)), Maryland (Science and Technology Scholarship Program (1998)), Michigan Merit Award Scholarship Act (1999), Mississippi (Merit Scholarship Award Program (1996)), Missouri (Higher Education Academic Scholarship Program) and New Mexico (Success Scholarship (1997)). The Education Commission of the States (http://www.ecs.org/ecs/ecsweb.nsf) provides descriptions of many of these programs, as well as other merit-based scholarship programs that impose more restrictions, such as income caps, limitations to specific disciplines, or a shorter duration.

accounting for the largest share of this increase. Others include Henry and Rubenstein (2001), who claim that HOPE has not led to grade inflation among high-school students, Dee (1998), who presents evidence that the program has increased volume and value of new single-family residential construction in Georgia border towns, and Dee (1999) who examines who loses the scholarship in college. With our current NSF support, we have been able to address some of the gaps in the literature on merit aid. The work related to this effort is discussed below. This proposal is for an agenda that continues and extends our merit-aid research.

II. Current NSF Support: Accomplishments

A. Research Findings

To date, our current NSF funding has facilitated the completion of two HOPE-related papers, "The Enrollment Effects of Merit-based Financial Aid: Evidence from Georgia's HOPE Scholarship" and "The Distributional Impacts of Lottery-funded Aid: Evidence from Georgia's HOPE Scholarship", which have been submitted to the *Quarterly Journal of Economics* and *National Tax Journal*, respectively.

The "Enrollments" paper focuses on the policy shift toward merit-based aid, as exemplified by the HOPE Scholarship, and its effects on college attendance. We treat HOPE as a natural experiment, contrasting enrollment rates in Georgia with those in the other member states of the Southern Regional Educational Board (SREB) using Integrated Postsecondary Education Data System (IPEDS) data from the National Center for Educational Statistics (NCES), covering the period 1988-97. Our findings can be summarized as follows.

First, we find that HOPE has raised the first-time-freshmen enrollment rate in Georgia 6 percentage points or 8 percent, relative to the rest of the SREB. Second, public and private 4-year colleges share the overall HOPE effect equally, while the coefficient estimates for 2-year schools are typically small and statistically insignificant. Interpreting the typical 2-year HOPE effect as zero suggests that seats vacated by students pursuing 4-year degrees were filled by individuals who would have otherwise entered the labor market. However, the schooling costs of any new 2-year-school enrollees were more likely financed by the HOPE Grant, which, as described above, applies exclusively to non-degree programs at 2-year institutions and has no merit requirements.

Third, this pattern is generally replicated when we disaggregate our analysis by race. For both blacks and whites, HOPE's influence is largely confined to 4-year schools, although the greater percentage changes for blacks occur in public institutions. In particular, our results indicate that black enrollment rates at 4-year public (private) colleges are 21 (16) percent higher because of HOPE. These increases in black enrollment rates can be explained in part by the large number of historically black colleges (HBCUs) located in Georgia. Thus, we find a smaller percentage increase in the overall enrollment rate, and a positive and significant impact on black enrollment rates where Dynarski finds none.

Fourth, based on interstate migration data and an overall HOPE effect estimate of 6 percentage points, we calculate that students' decisions to remain in-state account for as much as two-thirds of the scholarship-induced rise in total enrollments. If the change in

the relative price of in-state schools explains two-thirds of the overall HOPE effect, then at most one-third can be attributed to an expansion of access. Given that the change in relative prices along the 2-year–4-year margin encourages the pursuit of a 4-year degree, and the role the HOPE Grant plays in encouraging attendance at 2-year schools, one-third is probably an upper bound for the access component.

Finally, an overall HOPE effect of 6 percentage points leads to the conclusion that the scholarship raised total freshmen enrollments between 1993 and 1997 by roughly 3800 students, which accounts for only 4 percent of all freshmen awards during these five years. The corollary is that 96 percent of HOPE expenditures is rent. In sum, the primary role of the HOPE Scholarship has been to influence where, not whether students attend college.

The "Distributional Impacts" paper is one of the first to explicitly tie disbursements from lottery sales to specific recipients, and thereby examine the incidence of both the implicit lottery tax and lottery expenditures. The HOPE Scholarship provides a unique opportunity, because it is an entirely new program and the beneficiaries of the increased spending can be clearly defined. To make the connection between the tax and expenditure sides of Georgia's lottery, we collected data on lottery expenditures, the number of HOPE recipients, and the dollar value of HOPE disbursements for all 159 Georgia counties from 1993 to 1998. We also include in the county panel controls for population, race and gender, economic activity, government transfer and welfare payments, and education, poverty and religious identification.

Our conclusions about the implicit lottery tax confirm the central findings in the literature—lottery sales are disproportionately higher for African-American, low-income and poorly educated people. Beyond this, we shed new light on the determinants of lottery sales by considering factors that other studies exclude. We show, for example, that lottery sales rise with government transfer payments in the form of unemployment and income maintenance. At the same time, however, we find that sales generally fall with religious affiliation, especially for black Baptists. In fact, being African American and Baptist has the largest impact of any demographic characteristic. Perhaps more importantly, our results suggest that previous studies' estimates on the role of race in lottery sales probably suffer from omitted-variables bias.

On the expenditure side, we find that the allocation of HOPE awards only reinforces the incidence of the lottery tax. In particular, scholarship recipients are more likely to reside in counties with larger per capita incomes, consistent with Heckman (1999) (and others) who emphasize the link between pre-college academic achievement and family income. Further, counties with large African-American populations generally have significantly fewer HOPE recipients. An exception emerges only when we distinguish between public and private institutions; the data indicate that blacks are awarded scholarships at a higher rate for the latter. However, this exception is explained in large part by the presence of a significant number of private HBCUs in Georgia (Cornwell, Mustard and Sridhar, 2001). In any event, the share of all awards accounted for by private-school students is only 5 percent. Interacting race and education, the results are clearer: counties with poorly educated African Americans receive less aid to all types of institutions.

During this past year we also worked intensively with preparing the student-record data for analysis. These data come from three different sources—UGA

Admissions, Registrar's and Financial Aid Offices—and include every student who applied in UGA during this period. The enrollees alone total more than 50,000 students. While the effort involved in cleaning these data has been substantial, the payoff will be a unique ability to address important questions relating the effects of HOPE-style aid requirements on college behavior.

B. Research Dissemination

The "Enrollments" paper has received considerable attention, in scholarly circles, among policymakers, and in the popular press. We have presented versions of the paper at the University of South Carolina (April 2000) National Bureau of Economic Research Conference on Higher Education (November 2000), the Southern Economics Association (November 2000), the University of Georgia Institute of Higher Education (November 2000), Emory University (December 2000), the Society of Government Economists (January 2001, meeting jointly with the American Economic Association), the Carl Vinson Institute of Government (March 2001), the Society of Labor Economics Meetings (April 2001), the 18th Annual NASSGAP (National Association of State Student Grant and Aid Programs)/NCHELP (National Council of Higher Education Loan Programs) Conference (May 2001) and the Spring 2001 Financial Aid Research Conference sponsored by NASSGAP (June 2001). The paper will also be presented at the European Economics Association Meetings (August 2001), and in workshops at the University of Alabama, Georgia State University and Ohio State. In addition, the paper was featured in the Society of Labor Economics' Internet seminar in January 2001.

We created a website (www.terry.uga.edu/hope) to disseminate our HOPE research. Since the initial version of the "Enrollments" paper was released on the website in November 2000, it has been cited numerous times in press coverage of lottery-fund scholarship programs. In particular, our findings have been reported in *The Chronicle of Higher Education*, *Education Week*, *The New York Times*, *Black Issues in Higher Education* and the *Raleigh News and Observer*, as well as in a feature report of evening news broadcast of the NBC affiliate in Nashville, WSMV. Further, our research has been featured in *Terry Magazine*, the quarterly magazine of the Terry College of Business, and the *Georgia Research Reporter*, a tri-annual publication sent to UGA employees and alumni that discusses contemporary research advances. Links to most of these articles are provided on our HOPE webpage.

Finally, our work on this part of the project has given us substantial opportunities to influence policy debates in Georgia and South Carolina. The Georgia State Legislature commissioned the Carl Vinson Institute of Government to conduct a comprehensive evaluation of the first seven years of Georgia's lottery, and we were employed to assist the Vinson Institute in its analysis. We were also invited to testify before the South Carolina Lottery Impact Commission regarding the effects of lotteries and HOPE-style financial aid (August 2000), and Charles Clotfelter cited our research when he testified before the North Carolina Legislature, which is considering adopting a lottery-funded scholarship as well.

C. Impact of Research on Student Training and Instruction

Our current NSF funding has significantly enhanced student research and instruction. While not supported directly through our grant, Deepa Sridhar won a $15,000 dissertation grant from the Association of Institutional Research (AIR). Sridhar, whose dissertation we supervised, is a coauthor on our "Enrollments" paper, and graduated with her PhD Economics in May 2001. She has accepted a position at Rutgers University beginning this fall. A second graduate student, Kyunghee Lee, is being directly funded by our current grant. She has already begun the ambitious task of cleaning the student-record data to make it suitable for econometric analysis. Her efforts in this regard are laying the foundation for her dissertation research.

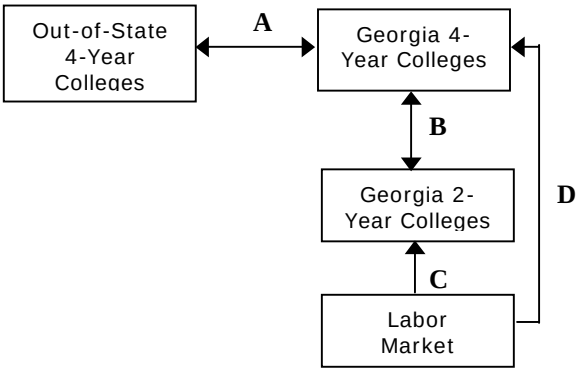
The impact of our current support has not been limited to graduate students. Our HOPE research attracted the interest of one of our undergraduate majors and honors students, Brooke Wells, as she was searching for an honors thesis topic. Her paper, "Merit-Based Financial Aid, College Choice and the Returns to Schooling," considered whether the "bribe" to remain in state is enough to compensate high-achievers for possible long-term loss of income due to attending the University of Georgia, over attending a more elite, out-of-state institution. Brooke's paper won UGA's undergraduate research prize for best in the social sciences and was selected for presentation at the National Center for Undergraduate Research Opportunities Conference at the University of Kentucky in March 2001.

Finally, our HOPE research led to the development of a new course, The Economics of Education, which has never before been offered at the University of Georgia. The course was taught for the first time during the Spring 2001 semester to honors students, and will be offered again next academic year.

III. Overview of Research Plan

Our work on the enrollment-rate effects of the HOPE Scholarship serve as the starting point for this proposal. The relative price changes induced by HOPE-style aid establish important enrollment-decision margins: in-state–out-of-state, 2-year–4-year, labor-market–2-year and labor-market–4-year, labeled A–D in Figure 1.

Figure 1: Margins Affected by HOPE-Induced Changes in Relative Prices



The most obvious is A, where the academically proficient face in-state public and private college prices that are reduced relative to their out-of-state counterparts.[5] However, with the "best and brightest" encouraged to stay home for their college education, entrance requirements may rise at the top universities in the state. Students denied admission at these schools, who do not regard the state's less selective 4-year colleges as close substitutes, may attend out-of-state institutions. For example, consider comments of a recent Georgia high-school graduate who was not eligible for admission to the University of Georgia with an 1150 SAT score and a high-school grade-point average of 3.4: "As a result of the HOPE Scholarship, above-average-but-not-quite-outstanding students are handing over the dough to schools like Auburn, Tennessee, Clemson, Alabama, Ole Miss and other large universities throughout the South."[6]

Because tuition is higher at 4-year colleges, a program like HOPE also reduces their price relative to 2-year schools (margin B). In addition, students deciding whether to attend a 2-year or 4-year college face similar wage differentials and their opportunity costs of college enrollment are similar (Kane and Rouse (1995)). Therefore, some HOPE-eligible students who would have otherwise enrolled in a 2-year or less-than-2-year college will pursue a 4-year degree instead. For the same reason as in A, however, movement along margin B could also occur in both directions. Rising academic standards at the best schools may drive some out-of-state, but they might induce others to start their postsecondary schooling at a 2-year institution.

Since they involve individuals whose labor-market alternatives compete with college attendance, C and D represent the access margins.[7] If credit constraints are empirically unimportant, the access effects of a merit scholarship will be small. Cornwell, Mustard and Sridhar (2001) suggest that at most one-third of the total HOPE effect on

[5] The impact of this change should be realized almost exclusively at 4-year schools, given that 2-year students are typically attend college close to home.

[6] Kristen Roberts, "HOPE Handicaps some of Georgia's Best Students," *The Atlanta Constitution*, 25 Jun 2001.

[7] Movement along margins C and D may also occur in both directions if the general-equilibrium effects of HOPE increase the relative wages of individuals who do not go to college (Heckman, Lochner and Taber (1998)).

enrollments in Georgia can be related to an expansion of access. However, much of the access component is due to the HOPE Grant, which, unlike the scholarship, is not based on merit.

The movements along these margins raise important questions about the effects of merit aid on student sorting and college stratification by ability, race and gender. An outline of the questions we propose to address is provided below:

A. Sorting by Ability
    1. Compared with similar schools in other states, how has been the scholarship affected the student quality of Georgia institutions by college type?
    2. Has HOPE increased the stratification of colleges by student aptitude? Has the scholarship increased the market concentration of high-ability Georgia residents in state "flagship" universities?
    3. What role has interstate migration played in the sorting process? Has HOPE increased the retention of the "best and brightest" at the expense of the (merely) good and affluent? To what extent has rising out-of-state demand for Georgia colleges contributed to stratification?
B. Sorting by Race and Gender
    1. Has HOPE had a differential impact on the enrollment rates of African Americans and women?
    2. To what degree has HOPE influenced the racial and gender composition of enrollments by institution type?
    3. Is there a relationship between the race and gender effects and stratification by student aptitude?

Individual sorting is a pervasive fact of life. Fernandez (2001) uses sorting as a lens through which she examines education, pointing out that school peers, neighbors, co-workers and spouses all play potentially important roles in determining expenditures on and returns to human capital. Fernandez also notes that there is evidence to suggest sorting is on the rise in the US. For example, from 1970 to 1990, segregation by income has increased in all metropolitan areas (Jargowsky (1996)), leading to primary and secondary schools that are more stratified by income and ability. A report released by Harvard University's Civil Rights Project released in July 2001 documents rising racial segregation in grades K-12. Hoxby (1997) finds increasing stratification by student aptitude among US baccalaureate colleges over the last 50 years. The probability that an individual with only a high-school diploma marries another with a college degree has decreased, indicating greater sorting in the marriage market (Mare (1991)).

The focus of this proposal is on the sorting opportunities in college attendance, and how merit-based financial aid influences them. As Heckman (1999) and others have argued, resources early in life determine in large part the level and quality of a person's postsecondary education. From the perspective of sorting, parental resources determine where you live and where you begin your schooling, which enhance a child's college prospects. A college degree, in turn, improves labor and marriage market opportunities. Thus, to the extent merit is correlated with household income, programs like the HOPE Scholarship reinforce the effects of sorting patterns established prior to the college enrollment decision.

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

IV. Sorting by Ability

Introduction

The expansion of merit aid in recent years, as exemplified by programs like Georgia's HOPE Scholarship, has occurred against a backdrop of an increasingly integrated US market for higher education. Hoxby (1997) demonstrates that rising competition during the last 50 years (due in large part to geographic integration) has substantially widened the distribution of inputs, tuition and student aptitude across colleges, and narrowed the distribution of student aptitude within colleges.[8] This trend has benefited the average student, as the erosion of local monopsonies over high-ability students increased the rewards to peer quality. At the same time, Hoxby argues, low-ability students may be worse off now, since a more highly integrated market places them in colleges with relatively few high-quality peers.

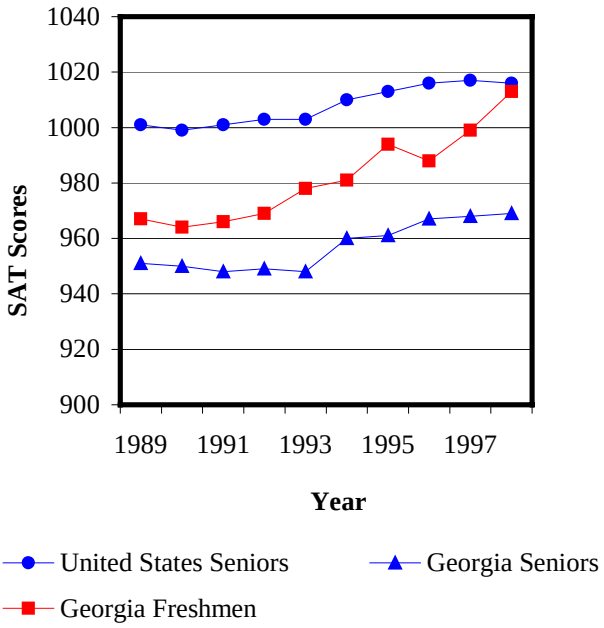
Cook and Frank (1993) contend the clustering of top post-secondary students has increased in recent years. Epple, Romano and Sieg (2000) find that colleges whose average student quality is near the median of the quality distribution provide discounts to more-able students, suggesting that peer effects are important in the production of higher education. Thus, institutional merit aid is essentially a college's implicit wage payment for peer quality. By reducing the relative price to high-achieving residents, a HOPE-style scholarship operates in the same way for all in-state colleges. However, because the schools within a state typically differ in terms of quality (and other characteristics that enter the enrollment decision), competition among scholarship recipients for admission to the top schools should lead to further stratification by ability, and income, to the extent ability and household income are correlated. As discussed above, part of the stratification process may involve less-able, affluent students leaving the state.[9] There is generally little empirical evidence on the efficiency gains and losses involved in post-secondary sorting (McPherson and Schapiro 1998). Henderson, Meiszkowski and Sauvageau (1978), who study primary students in Canada, contend that removing a superior student from a group of other high-quality students and placing that student among weak students raises the achievement level of the weak students more than it reduces the achievement of the student's former class.

[8] Ehrenberg (2001) discusses an interesting dimension of this competition—the *US News and World Report* annual rankings of colleges and universities. He notes that that when an institution improves in the rankings, the following year it can expect to have more applicants, accept fewer of them, realize a higher yield, increase its average SAT score and reduce the amount of institutional grant aid required to attract its class.

[9] Groen and White (2001), in examining the objectives of state governments and public universities, claim that states are always better off (in terms of tax revenues) when a more-able student attends college in state, whether the school is public or private. In terms of degrees conferred, however, Bound, et al. (2001) find that the link between a state's production of higher education and its stock of human capital is weak.

Support for the proposition that Georgia's scholarship program has affected student quality is seen in the recent upswing in Georgia freshmen SAT scores. Figure 2 plots the SAT series for freshmen enrolled in Georgia public colleges, along with those of high-school seniors in Georgia and the rest of the US. The increases in SAT scores among Georgia freshmen stand out, rising almost 40 points after the HOPE program was started, while the scores of high-school seniors rose much more modestly. While the data in Figure 2 are instructive about HOPE's impact on average student quality, they reveal nothing about the scholarship's effects on sorting.

Figure 2: Comparing SAT Scores of High-School Seniors and College Freshmen United States and Georgia, 1989-90 to 1998-99



Data and Empirics

We plan to address the questions regarding HOPE's influence on ability sorting using the Peterson's Undergraduate Database (which we are in the process of acquiring) and the student-record data from UGA collected under our current NSF grant.

Peterson's Undergraduate Database is one of the most comprehensive sources of information on US institutions of higher education available. For 2001, the database includes 2,127 4-year and 1,732 2-year accredited colleges and universities. To be included, an institution must either have full accreditation or pre-accreditation status granted by an institutional or specialized accrediting body that is recognized by the US Department of Education. Coverage extends back to the 1983-84 academic year. Importantly, for each college, Peterson's reports the distribution of SAT and ACT scores of first-time freshmen across six separate quantiles. The database contains other freshmen quality measures as well, including the distribution of students by high-school class rank and the number of National Merit Scholars. The freshmen quality data are combined with

an extensive array of college characteristics, such as the Carnegie Classification, degree offerings, athletic programs and campus features.

The Peterson's data will allow us to contrast the student quality of Georgia colleges with comparable sets of institutions in other states. The basic framework for the this analysis is a difference-in-differences regression of the form

$$Q_{it} = \alpha + \beta_t Y_t + \gamma_i I_i + \delta_{GA,t} S_{GA} H_t + X_{it}^{'} \xi + \varepsilon_{it} \quad (1)$$

where Q_{it} is a measure of freshmen quality in institution i in year t, Y_t is a year dummy, I_i is an institution dummy, S_{GA} is a dummy variable with a value of 1 for institutions located in Georgia, H_t is a HOPE indicator equal 1 in year t and 0 otherwise ($t = 1993,94...$) and X_{it} is a vector of covariates. Our plan is to estimate (1) for comparable groups of institutions, using the Carnegie Classification scheme, distinguishing between public and private schools. This categorization is more refined than the 4-year/2-year distinction depicted in Figure 1, and as such, should provide a more detailed picture of HOPE-induced sorting. As implied by our description of the data, we will examine the effect of HOPE on several definitions of Q_{it}: the mean freshman SAT percentile ranking,[10] measures of variance including the standard deviation and interquartile range of freshmen SAT scores, the percentage of the student body in the top 10 percent of their high-school class, and for the top institutions, the concentration of National Merit Scholars.

The broad coverage of the Peterson's database will facilitate a good deal of experimentation with control groups. Nevertheless, we will need to consider covariates that may be correlated with Q_{it} and the HOPE intervention. The literature on the determinants of SAT scores suggests we should be concerned about changes in a state's high-school graduation standards, adult educational attainment, black population, migration patterns and household income (see, e.g., Behrendt, Eisenach and Johnson (1986)). Further, given the heterogeneity in college size, even among narrow categories of institutions, the regressions captured by (1) should be weighted by enrollments.

In addition, with the Peterson's data we will be able to examine changes in college-specific quality distributions within Georgia, again distinguishing between public and private institutions. If HOPE increased stratification by ability among Georgia colleges, we should observe rising between-school variance and declining within-school variance since the scholarship was introduced. Both margins A and B should be important in this regard, potentially intensifying the tournament for admission to the state's top universities.

Finally, the UGA student-record data will provide a detailed picture of changes in the ability distribution of first-time freshmen at the state's flagship university. Following DiNardo, Fortin and Lemieux (1996), we will compute kernel estimates of SAT densities that will allow us to assess the effects of changes in admissions criteria pre- and post-HOPE. In particular, we will be interested in the counterfactual of what would be the SAT distribution of the current freshmen class in the absence of HOPE.

[10] Following Hoxby and Long (1999), we will convert ACT scores into SAT scores, and then convert the latter to percentiles using distribution information published by the College Board.

V. Sorting by Race and Gender

Introduction

We are concerned about differences in educational attainment between specific groups because of schooling's importance in determining economic success. Racial differences in the level and quality of educational attainment have increased wage inequality between blacks and whites. This gap has widened as black youth have responded more slowly to the rise in the returns to a college degree. Using data from the NLSY, Cameron and Heckman (1999) argue that long-run factors associated with parental background and income, and not short-term credit constraints, account for the racial differences in response to the rising returns to a college education. As evidence, they report that a $1000 Pell Grant increase generates less than a 1 percent increase in enrollments, while a comparable change in tuition yields a response of 6-8 percent.

A merit-based tuition offset like HOPE may have a greater effect on black enrollment rates than increased Pell Grant generosity, since many Pell eligibles do not have the academic credentials to enter college. Cornwell, Mustard and Sridhar (2001) find that HOPE raised the black (white) enrollment rate at 4-year public colleges 21 (5) percent, and at 4-year private institutions, 16 (12) percent. However, for blacks and whites, the relative price effects reflected along margins A and B in Figure 1 account for most of these gains. Further, the presence in Georgia of a large number of HBCUs, all but one having a Barron's selectivity index rating of "less competitive," is an important factor in the black enrollment rate increase.

Roughly in parallel with the growing disparity in educational attainment between blacks and whites, a gender gap in college enrollments has emerged, with women attending in increasingly greater numbers than men. In the Fall 2000, men comprised 44 percent of US undergraduates, less than 43 percent of Georgia undergraduates and only 39 percent of the freshmen class at UGA. Men last constituted the majority of US undergraduates in 1979.

Gender-related sorting in higher education has important implications for household sorting. However, according to Fernandez (2001), the work on household sorting is still at an embryonic level, with the role of gender differences in educational attainment largely ignored. Some insight into the problem is provided by Angrist (2000), who examines the consequences of imbalanced sex ratios in certain ethnic groups created through immigration. He shows that higher sex ratios (*men/women*) increased the likelihood of female marriage, male earnings and the incomes of parents with young children. As Angrist concludes, these results are consistent with theories in which male competition for women in the marriage market rises with the sex ratio, leading to greater effort devoted to attracting and retaining a wife, thereby reinforcing traditional family structure.

Obviously, a merit-based scholarship will not alter the sex ratio in general, but if it exacerbates the gender gap in higher education, it could affect outcomes in the marriage market. In a similar vein, a widening gender gap in college attendance will likely alter the nature of social exchange between men and women while in school. Further, if it is tied to high-school grade-point average, like Georgia's HOPE program,

we might expect a merit scholarship to benefit women more than men, since women tend to earn better grades in high school.

Data and Empirics

As indicated above, Cornwell, Mustard and Sridhar (2001) have estimated the enrollment rate effects of the HOPE Scholarship by race. Here, we will extend that analysis to women and men, following their empirical strategy. Then we will consider HOPE's influence on the composition of enrollments, using the framework of (1), but with the dependent variable, say R_{it}, defined as either the black-white or male-female ratio of first-time freshmen in institution i in year t. To assess the relationship between the racial and gender composition of first-time enrollees and the sorting of freshmen by ability, we will estimate the difference in differences in R_{it} by the selectivity class, distinguishing between public and private institutions. The data for this project will be drawn from both IPEDS and Peterson's.

In addition to the covariates listed above, we will need to control for changes in affirmative action policy. Peterson's surveys institutions regarding their admission preferences. Of course, changes in these stated preferences could represent endogenous responses to HOPE. For example, as a consequence of court actions, UGA abandoned its policy of favoring men beginning in Fall 2000.[11] Thus, we will also consider the racial and gender composition of high-school graduates as instruments, assuming that the size of these shares influence college diversity goals.

Finally, we will return to the kernel estimation of UGA freshmen SAT densities, decomposing the distributions by race and gender.

VI. Policy Implications

Aid for postsecondary education has been increasingly based on merit and this trend looks to continue as HOPE-style scholarship programs spread to new states. This greater emphasis on merit has many important policy implications, especially as it influences the stratification of higher education by ability, race and gender. As discussed above, evidence suggests that sorting is on the rise. On the one hand, ability sorting by ability could enhance education efficiency by allowing top students to challenge and learn from their peers and matching students and teachers of comparable quality. On the other hand, mixing students may increase efficiency because having a critical mass of able students may be a necessary condition for a quality teaching and learning experience. Also, mixing may increase efficiency by facilitating positive spillovers as high-quality students influence lower-quality peers. Which effect dominates is an empirical question. McPherson and Schapiro (1998) maintain that although some research on these issues exists for primary and secondary education, there is little evidence about the optimal type of sorting at the postsecondary level.

One of the most hotly contested contemporary policy discussions is the ability of minorities to access high-quality educational institutions. Since *University of California*

[11] Nevertheless, UGA maintains a preference for African Americans.

Board of Regents v. Bakke (1978) when the Supreme Court ruled that universities could not use quotas to set aside a defined number of spaces for minorities, courts have generally scaled back the ability of schools to use race as a factor in admissions. To promote equal access and maintain some significant degree of racial integration, many top public institutions have designed alternative ways to give preferred admissions to minorities. However, many of those strategies are under court scrutiny, as exhibited by pending cases with the Universities of Georgia and Michigan. Some institutions, like the University of California, are developing alternative strategies that change the emphasis on standardized tests, on which high-income whites score relatively highly. Other institutions give extra weight to "strivers"—those who have overcome economic or family hardship to perform well in high school. How does merit aid affect racial sorting? By placing a greater emphasis on merit, which is correlated with income and family background, programs like HOPE may work against these institutions' efforts to attract and retain more minority students.

Sorting by gender raises similar questions. The large increase in the share of women in college has led many institutions to take significant steps to attract males to their campuses. Clayton (2001) discusses how universities address this issue by using a variety of methods, such as assigning males extra points in the admissions decision, recruiting men more aggressively, and accepting males with lower grades and scores. Some institutions, like the University of Georgia, have been compelled to drop their gender-based admissions policies, while others practice such preferential treatment more covertly. Many university officials assert that gender balance is critical to academic quality, class dynamics, and social life at coed schools. However, others criticize this notion, and argue that educational institutions place a greater emphasis on ability. Less academically qualified males should not take the place of more able women. Does merit aid alleviate or exacerbate the challenges institutions face in providing balance enrollment by gender?

With its inception in 1993, Georgia's HOPE Scholarship has created an ongoing, large-scale experiment for empirically testing many policy implications of merit aid, and in particular those related to the stratification of higher education by ability, race and gender. We expect the findings of this research to be of interest to policymakers, educators and citizens, both in Georgia and across the US. Documenting the effects of HOPE-style scholarships should prove valuable for those states that have recently adopted, or are considering whether to adopt, a similar program.

VII. Research Dissemination: Graduate Student Research and Timetable

Graduate Student Research

We are very committed to including graduate students in our research agenda. As described above, our NSF funding has already promoted the completion of one PhD thesis and a second is under way. The additional graduate student funding requested in this proposal would enable us to continue integrating graduate students into this project. Assistance with the large Peterson's relational database is a particular need for us, and will likely serve as the empirical setting for a graduate student's dissertation.

Research Dissemination

Our primary objective is to publish articles in high-quality refereed journals. Because attending conferences and workshops effectively increases the quality of our research and facilitates the dissemination of the research to academics and policymakers, we will make it a priority to present our work. As listed above, we have presented HOPE-related research twelve times–at six academic conferences, two university workshops, and four policy institutes or conferences. In addition, we have the future presentations scheduled: one academic conference, one policy conference and three universities.

For the research proposed here we will continue to actively pursue conference and workshop presentation opportunities. Potential conferences include the American Economic Association, National Bureau of Economic Research Conference on Higher Education, Society of Government Economists, Society of Labor Economists, the Association for Public Policy Analysis and Management, European Economics Association, Econometrics Society, and International Tax and Public Finance Association. Also, representatives from NASSGAP and NCHELP indicated that they would be interested in having us present again as we develop our research further.

By further building on our existing relationships with policy-related institutes we will communicate our research to policymakers. We will write at least three *Policy Notes* concerning our findings for the Carl Vinson Institute of Government, and we are discussing similar opportunities with the University of Georgia Institute of Higher Education. In addition, the Institute of Higher Education is in the initial planning stages of hosting a conference on higher education finance. The goal of both institutes is to convey ongoing academic research to legislators and policymakers.

Last, we will continue to utilize our HOPE website to disseminate our research to academics, policymakers, the media and the general public.