

# *Opportunities for Low–Income Students at Top Colleges and Universities: Policy Initiatives and the Distribution of Students*

**Abstract** - Whether the nation's most selective and resource-intensive colleges and universities are successful in serving as "engines of opportunity" rather than "bastions of privilege" depends on the extent to which they increase the educational attainment of students from the most economically disadvantaged backgrounds (Bowen, Kurzweil, and Tobin, 2005). Less than 11 percent of first-year students matriculating at 20 highly selective institutions were from the bottom income quartile of the income distribution, leading to significant concerns from higher education leaders and policy makers about the role of higher education in reducing intergenerational inequality, particularly in an era of high returns to education. Responding to what Lawrence Summers described as the "manifest inadequacy of higher education's current contribution to equality of opportunity in America," Harvard University and other public and private universities have introduced new initiatives designed to encourage the enrollment of students from low- and moderate-income families. One question addressed in this paper is whether the population of low-income students with high observed academic achievement is sufficiently large that aggressive institutional policies will be an effective tool in increasing the representation of low-income students at the most highly ranked colleges and universities. Using data on test-taking outcomes, we also examine where students currently send scores (as a proxy for application) and then consider the extent to which differences in family income affect students' choice sets. While the problem of the underrepresentation of low-income students affects both public and private universities, the effect of outreach and financial aid policies on outcomes is likely to differ appreciably across institutions.

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**INTRODUCTION**

There is no question that students from the most economically disadvantaged families are underrepresented at the nation's most highly ranked and resource-intensive colleges and universities. Although low-income students are significantly underrepresented at top-ranked institutions, proportional representation by family income at these institutions would hardly put a dent in the overall differences

in enrollment by family income in the United States.<sup>1</sup> Because top-tier universities are often thought of as “gateways” to positions of leadership, these colleges and universities may provide important opportunities for intergenerational mobility and may yield the highest returns for low-income students (McPherson, 2006).<sup>2</sup>

Recently, institutional leaders in higher education have focused on the introduction of aggressive efforts to increase the collegiate attainment of low-income students. Public universities like the University of Virginia and the University of North Carolina and major private institutions like Princeton University, Harvard University and Brown University have introduced policies to increase the representation of students from low-income families. Beyond the altruism implicit in these initiatives, doing more to meet the needs of a broad base of the population is a political imperative for colleges and universities in order to maintain or increase public support through direct appropriations and preferential tax treatment.<sup>3</sup>

Education leaders have promoted programs to increase aid and outreach to low-income students and embraced the tangible objectives of increasing the representation of low-income students in the near term. Behind the enthusiastic oratory is a substantial challenge. At its core are the fundamental questions of why low-income students are underrepresented and how to deploy resources

to change the outcome. The question of why low-income students are underrepresented can be parsed into the stages of preparation, application, admission and matriculation and leads to issues of whether students from the most economically disadvantaged families are underprepared, unable to finance top schools, or simply unaware of opportunities. In this paper, we are particularly focused on the comparison between selective private colleges and universities and flagship public universities in the opportunities afforded to low-income students, as well as on the distinction between states in the extent to which low-income students are represented at the flagship university.

We begin with a review of the degree of underrepresentation of low-income students at the most resource-intensive colleges and universities. A primary question is whether the population of low-income students with high observed academic achievement is sufficiently large that aggressive institutional policies will be an effective tool in increasing the representation of low-income students at the most highly ranked colleges and universities. With data on test-taking outcomes and family income, we examine where students currently send scores (as a proxy for application). Finally, we are interested in how the policies of public and private universities differ in their reach. We provide both empirical evidence and a theoretical discussion of how aid will change the distribution of students among schools.

<sup>1</sup> For example, first-year students at the 20 most highly ranked colleges and universities accounted for a mere 3.5 percent of first-year student enrollment.

<sup>2</sup> McPherson (2006) notes that for two decades, presidential candidates from both parties hold degrees from either Harvard or Yale, while the only Supreme Court justice not to hold a degree from an Ivy League school is John Paul Stevens, who holds degrees from Northwestern and University of Chicago (Cohen, 2005). What is more, Dale and Krueger (2002) find that the interaction between parental income and school-average SAT scores (an indicator of college quality) is less than zero, indicating that students from lower-income households have a higher payoff to attending a more selective college.

<sup>3</sup> Nonprofit and public colleges and universities pay neither income nor property taxes, while also receiving donations on a tax deductible basis. Turner (2006) discusses the coupling between institutional efforts to improve the dependability of revenue streams from states and the introduction of the AccessUVA program to increase the representation of low-income students at the University of Virginia.

Our empirical analysis focuses on the distribution of low-income potential college students, as defined by those students who take a major college preparatory exam (either the SAT or the ACT). While this is a relatively narrow definition of the pool of potential college students, it is a starting point. The important long-term question left unanswered by this analysis is whether the demonstration of increased opportunities for low-income students in the most resource-intensive sectors of higher education (and information about these programs) can serve to increase the pool of high-achieving students prepared to excel at the nation's top colleges and universities. Our review of the evidence makes clear that there are substantial differences across markets—between public flagship universities and private colleges and universities, as well as among state universities—that suggest that expecting all universities to achieve the same numeric target is both unrealistic and potentially inefficient. “One-size-fits-all” policies should be avoided.

### THE UNDERREPRESENTATION OF LOW-INCOME STUDENTS

High-school graduates from low-income families are dramatically underrepresented at the nation's most highly ranked colleges and universities.<sup>4</sup> In a recent analysis of application, enrollment and matriculation, Bowen, Kurzweil and Tobin (2005) find that students from the

bottom income quartile account for about ten percent of enrollment at many of the most selective colleges and universities. Underrepresentation of low-income students is not limited to private universities; it persists at the public flagship universities and liberal arts colleges as well.

Table 1 presents some motivating statistics based on data indicating the representation of students from low-income families at the most highly ranked undergraduate institutions. We present the share of dependent students with incomes less than \$30,000 and \$60,000 based on data assembled by The Institute for College Access and Success, Inc. (TICAS) from federal sources.<sup>5</sup> Less than five percent of dependent students at the two most highly ranked universities (Princeton and Harvard) are from families earning less than \$30,000. Yet, the underrepresentation of low-income students is not an entirely private phenomenon. Table 1B presents similar measures for the state flagship universities, and the overall story of underrepresentation is not terribly different. While 23.5 percent of families with 17-year-old children in the U.S. live in families earning less than \$30,000, we find only 8.2 percent of students in top-ranked private universities and about nine percent of students in flagship state universities are from low-income families. Understanding the determinants of this underrepresentation and considering the effects of various policy initiatives is the purpose of this paper.

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<sup>4</sup> In addition to the analysis by Bowen, Kurzweil, and Tobin (2005), a number of other policy and academic publications have focused attention on the underrepresentation of low-income students at selective private institutions and public flagship institutions. While there are significant problems with the use of the representation of students receiving Pell grants as an indicator of how well institutional policies encourage the attainment of low-income students (Tebbs and Turner, 2005), rankings of institutions by Shireman (2002), Heller (2003) and Mortenson (2004) have been effective in bringing public attention to the underrepresentation of the most economically disadvantaged students at the most selective institutions. A recent website introduced as [Economicdiversity.org](http://Economicdiversity.org) provides much more detailed information about the economic characteristics of students applying for financial aid at a range of colleges and universities.

<sup>5</sup> Note that for the purposes of the allocation of financial aid, students are distinguished between “independent” and “dependent” students, with parental income used in the determination of ability to pay for the latter group. Determination of “independent” status requires a student to be at least 24 years old, a veteran, married, or have legal dependents other than a spouse.

TABLE 1A  
REPRESENTATION OF LOW-INCOME STUDENTS AT NATIONALLY RANKED UNIVERSITIES,  
2000-2001

US News Rank	School	N= Dependent Undergrads.	Percent of Dependent Undergraduates	
			Income <\$30,000	Income \$30,000-60,000
1	Harvard University	7,643	4.4%	9.4%
1	Princeton University	4,058	4.7%	10.1%
3	Yale University	5,249	6.1%	9.6%
4	University of Pennsylvania	9,381	7.1%	11.6%
5	Duke University	5,761	6.7%	11.8%
5	Stanford University	5,225	9.7%	14.9%
7	MIT	3,842	14.1%	16.3%
7	California Institute of Technology	844	9.7%	17.2%
9	Columbia University	7,265	7.6%	9.1%
9	Dartmouth College	3,992	6.1%	11.9%
11	Washington University-SL	6,303	4.4%	10.3%
12	Northwestern University	6,915	7.3%	13.7%
13	Johns Hopkins University	4,556	6.9%	12.3%
13	Cornell University	12,700	10.1%	13.6%
15	University of Chicago	3,582	20.8%	18.4%
15	Brown University	5,741	5.2%	9.1%
17	Rice University	2,368	8.8%	9.2%
18	Vanderbilt University	5,379	5.6%	12.5%
18	University of Notre Dame	7,162	3.9%	10.5%
20	Emory University	5,802	7.0%	11.9%
20	UC-Berkeley	23,048	16.2%	14.3%
22	Carnegie Mellon University	4,967	7.4%	12.2%
23	Georgetown University	6,767	7.1%	9.2%
23	University of Virginia	10,888	5.1%	10.9%
25	UCLA	25,496	17.7%	16.1%
27	Univ. of North Carolina-Chapel Hill	13,345	7.0%	13.9%
27	Tufts University	5,154	6.7%	9.7%
27	Wake Forest University	3,808	3.9%	9.3%
30	University of Southern California	14,813	14.5%	17.3%
	Total	222,054	9.8%	12.9%

Source: TICAS "Economic Diversity of Colleges" files. Note that the total number of dependent students is estimated.

### Public-Private Differences

A distinctive feature of the U.S. education market is the coexistence of privately and publicly controlled institutions of higher education and keen competition between them, even at the top tier of education. Underrepresentation of low-income students in undergraduate education exists at both public and private institutions, though the magnitudes, causes and policy implications are likely to be quite different across institutional types. The reason why the private-public distinction is so important is that the margin at which students choose to enter the national market for higher education

is likely to differ by state depending on the strength of the best state institution for which a student would pay the substantially discounted "in-state" tuition at a public university. Sorting into the national market differs by state. In states with very high-quality public universities, only a small number of elite private universities are likely to be considered preferable to the state flagship.

One salient difference between public flagship institutions and their private peers is scale. On average, public flagship universities are much larger than their private peers, affording them the opportunity to serve more students. The average size of the private universities in Table 1A

**TABLE 1B**  
DISTRIBUTION OF LOW-INCOME STUDENTS AT STATE FLAGSHIP UNIVERSITIES,  
2000-2001

University	N= Dependent Undergrads.	Percent of Dependent Undergraduates	
		Income <\$30,000	Income \$30,000-60,000
University of Alabama/Tuscaloosa	12,127	13.3%	14.6%
University of Alaska/Fairbanks	4,648	4.9%	5.6%
University of Arizona	21,947	9.5%	12.6%
University of Arkansas/Fayetteville	10,692	12.8%	17.5%
University of California Berkeley	23,048	16.2%	14.3%
University of Colorado/Boulder	22,210	5.4%	9.1%
University of Connecticut/Storrs*	13,512	9.5%	16.8%
University of Delaware	13,049	4.8%	13.9%
University of Florida	31,470	10.7%	14.3%
University of Georgia	22,898	5.8%	12.9%
University of Hawaii/Manoa	10,719	11.7%	11.4%
University of Idaho	10,913	7.6%	14.1%
University of Illinois/Urbana	23,990	11.3%	16.5%
Indiana University/Bloomington	28,743	6.4%	12.6%
University of Iowa	19,415	5.4%	12.7%
University of Kansas/Lawrence	18,192	6.0%	11.3%
University of Kentucky/Lexington	22,418	8.2%	12.8%
Louisiana State University/Baton Rouge	23,686	11.6%	16.1%
University of Maine/Orono	7,520	18.1%	33.7%
University of Maryland/College Park	23,517	8.7%	12.4%
University of Massachusetts/Amherst	18,556	11.0%	18.1%
University of Michigan/Ann Arbor*	31,601	7.0%	11.1%
University of Minnesota/Twin Cities	32,893	6.2%	14.3%
University of Mississippi/Oxford*	9,102	16.3%	11.9%
University of Missouri/Columbia	15,277	9.6%	20.5%
University of Montana/Missoula	8,122	12.8%	20.6%
University of Nebraska/Lincoln	15,864	8.1%	19.0%
University of Nevada/Reno	6,935	18.2%	9.7%
University of New Hampshire/Durham	9,368	9.2%	19.2%
Rutgers/New Brunswick*	28,709	19.1%	17.1%
University of New Mexico/Albuquerque*	16,634	13.1%	13.3%
State University of New York/Buffalo	6,912	18.5%	23.3%
University of North Carolina/Chapel Hill	13,345	7.0%	13.9%
University of North Dakota/Grand Forks	7,664	8.6%	23.3%
Ohio State University/Columbus*	40,260	8.1%	16.4%
University of Oklahoma/Norman	15,673	10.3%	14.8%
University of Oregon/Eugene	13,209	8.9%	15.5%
Pennsylvania State University*	57,819	10.8%	20.4%
University of Rhode Island	10,434	11.6%	16.4%
University of South Carolina	14,179	12.2%	15.0%
University of South Dakota/Vermillion	4,468	9.7%	22.4%
University of Tennessee/Knoxville	16,848	8.2%	13.4%
University of Texas/Austin	35,252	10.0%	11.7%
University of Utah	14,153	5.3%	9.3%
University of Vermont	8,503	6.8%	14.2%
University of Virginia/Charlottesville	10,888	5.1%	10.9%
University of Washington*	24,898	8.3%	13.2%
West Virginia University/Morgantown	13,720	12.6%	21.6%
University of Wisconsin/Madison	26,385	4.3%	11.8%
University of Wyoming	7,080	8.7%	17.3%
Total (not incl systems)	676,930	9.1%	

Note:\* indicates that numbers are reported for the "system office" and include satellite campuses in addition to the flagship.

Source: TICAS "Economic Diversity of Colleges" files. Note that the total number of dependent students is estimated.

is about 6,000 dependent undergraduates relative to about 14,000 students at the public flagship universities in Table 1B. Thus, it is not surprising that the public institutions have a higher variance in student achievement. The ratio of the 75<sup>th</sup> to the 25<sup>th</sup> percentile of standardized test scores is persistently higher at the public universities than the privates. (On average, the ratios are about 1.21 (math) and 1.2 (verbal) for the public universities and 1.12 (math) and 1.14 (verbal) for private universities.)

Finally, public universities and private universities differ markedly in their sources of funding and their tuition structures. With public universities (historically) receiving a sizeable share of funding from the state, these institutions offered in-state students substantial subsidies. The reliance on public funding leads, in turn, to an emphasis on recruitment of students from the state. Substantial public appropriations are tendered by state governments in exchange for “preference” for in-state students in admission, as well as lower prices.

While there is considerable variation among private universities in the extent to which revenues are dependent on tuitions, many of the most selective private universities have substantial endowments. For example, Harvard University, Yale University and Stanford University with endowments in June of 2005 in excess of \$25 billion, \$15 billion and \$12 billion, respectively, were able to add considerable private subsidy to tuition revenues. The result is that even quite high posted tuition charges are appreciably less than the per-student cost of educational production. Winston (1999) provides considerable discussion on the level and distribution of subsidies in higher education, explaining how the presence of very large subsidies at a small number of institutions generates substantial stratification in the higher-education market.

Whether the “sticker price” (posted tuition) is a barrier to enrollment and

attainment is a point of substantial dispute. In the aggregate, the price elasticity of demand is relatively modest and we would expect it to be even smaller for those students likely to attend relatively selective colleges and universities. Low-tuition strategies for state universities have been advocated by some as a means to achieve “access” for low-income students and a demonstration of the commitment of states to providing opportunities to students from the most economically disadvantaged backgrounds. Yet, it has long been argued that—at least at state flagship universities—the role of low-tuition policies in increasing opportunities for the lowest-income state residents may be largely symbolic. As long ago as the 1960s, some economists have argued that the primary beneficiaries of low-tuition policies are students from relatively affluent families who are likely to be over-represented at institutions receiving the largest subsidies from the state (Hansen and Weisbrod, 1969).

#### *Explanations for the Underrepresentation of Low-Income Students*

A diagram of the likely causes of the underrepresentation of low-income students in higher education would surely include the following types of explanations:

- *Precollegiate achievement and preparation*—High-school graduates from low-income families may lack college-readiness, because they are relatively more likely to attend relatively low-quality elementary and secondary schools and they may have access to fewer resources in the home that facilitate college preparation.
- *Credit constraints*—Students from low-income families are unable to access full credit markets to finance collegiate investments, creating the need to work or live at home, which

may interfere with the best schooling choices.

- *Information constraints*—Potential students (and their parents) from low-income families may not know about opportunities at top tier schools (including the availability of financial aid). Information problems may occur at the point of college application or, more broadly, earlier in the pipeline affecting aspirations and preparation for college.

It would be overly simplistic to claim that any of these explanations represents the sole reason for the underrepresentation of low-income students at top colleges and universities. What is more, the relative importance of these factors likely varies substantially over the spectrum of prospective college students and collegiate opportunities (and, as we suggest later in this analysis, by state). Low-income students with modest academic achievement considering enrollment in local institutions may face quite different barriers (and, perhaps, greater financial constraints) than low-income students with high secondary achievement.

At many selective private institutions, “sticker prices” are appreciably higher than the net price that a student with substantial financial need would be expected to pay to attend. Estimates from Hill, Winston, and Boyd (2005) note that only about one-quarter of the full price of many Ivy League universities and private liberal arts colleges is not covered by grants and that many of these institutions adhere to policies in which they promise to meet full financial need. This is not to say that college costs are a “non-issue”; rather, one concern is that potential students are unaware of the full range of aid opportunities. Also, aid is not uniformly generous; outside about the top 30 private colleges and universities, many institutions are unable to provide packages meeting full need.

Beyond financing, what goes on in the elementary and secondary levels—with gaps in outcomes by family income starting early—places substantial limits on the number of low-income students who are well prepared to succeed in the top colleges and universities. The gaps between low-income students and their more affluent peers develop well before high-school graduation. Lower rates of taking college entrance exams and lower levels of performance on these exams are one manifestation of the differences between low- and high-income youth in their precollegiate attainment. Using data from the National Educational Longitudinal Survey, Bowen, Kurzweil, and Tobin (2005) show the broad difference in progression through the benchmarks of college preparation: about 32 percent of high-school students in the bottom quartile of the family income distribution took the SAT relative to about 68 percent of students in the top income quartile.

In the next section, we examine the extent to which precollegiate achievement and understanding of the application process are likely at play in limiting the enrollment of low-income students in top-tier colleges and universities. Then, in the final section, we turn to the question of how the newly introduced institutional initiatives are likely to affect collegiate enrollment and attainment of low-income students. Because most of these initiatives intended to increase the representation of low-income students have been in place for only a short period of time, it is far too early to evaluate their effects; instead, we concentrate on forecasting the short-run margins of response based on the available data.

## VARIATION IN STUDENT ACHIEVEMENT AND KNOWLEDGE OF UNIVERSITIES

Our measures of student achievement and family circumstances come from the

descriptive questionnaires completed by students prior to taking both the SAT and ACT pre-collegiate exams. Beyond recording student performance on these standardized tests, we are able to examine responses to questions about family income. Neither measure is ideal—test scores are but one indicator of college preparation and student-reported family income may be subject to substantial measurement error. Nevertheless, these measures serve as a starting point for measuring differences nationally and by state in income and test scores.

Throughout this analysis, we focus on the distribution of test-takers from the high-school class of 2000. This year of observation is conveniently aligned with the decennial census and is a year in which we observe both ACT and SAT outcomes. Unfortunately, we are unable to merge individual records of the SAT and ACT to identify students taking both exams, though as appropriate we focus on the SAT or the ACT based on the test employed by the flagship university in each state.

### *Overall Differences in Achievement*

Figures 1 and 2 provide a starting point for our analysis of the overall distribution of SAT and ACT scores by reported family income. Figure 1 shows the distribution of SAT test-takers for three income groups—students with family income less than \$35,000, \$35,000 to 80,000, and greater than \$80,000. Arranged this way, the bottom group accounts for 28 percent of test-takers with known family income, the middle group, about 46 percent, and the top group, 26 percent.<sup>6</sup> From the number of test-takers with different levels of family income achieving each SAT score (top panel) and the percentage dis-

tribution of scores within each income group (bottom panel), it is apparent that there are substantial differences in the number of students from each income group taking the test and achieving each score, and that the highest-income group is overrepresented in the far-right tail of the distribution. In terms of the means of the distribution, nearly 175 points separate those with incomes below \$35,000 from the top group, with the former averaging scores of 926, and the latter, 1109 (the middle group has a mean of 1023). In the far right tail, the differences are particularly marked. Looking at students scoring above 1400, youth from families with income above \$80,000 outnumber those with incomes below \$35,000 by about 6:1, while high-income youth outnumber those from families in the \$35,000 to \$80,000 range by about 1.5:1.

The same basic pattern appears among ACT test-takers. Test-takers with family incomes below \$36,000 score just over four points lower (worse) on average on the ACT than do students with family incomes of more than \$80,000: their average score is 18.8, compared to an average of 29.9 for the higher-income group. They are underrepresented at the top of the distribution. Though they comprise 32.8 percent of test-takers, they represent only 12.4 percent of those scoring 32 or higher on the ACT (which is equivalent to a 1410 or higher on the SAT), while students with family incomes of \$80,000 comprise 40.6 percent of those scoring above a 32 even though they represent only 19.5 percent of test-takers.

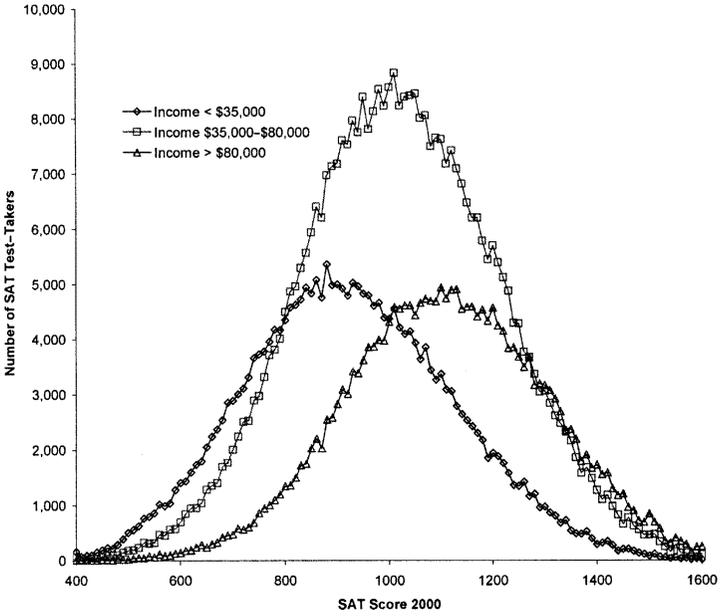
### *Differences in the Pool of High Achieving Students Among States*

Although the national differences in student achievement by family income are

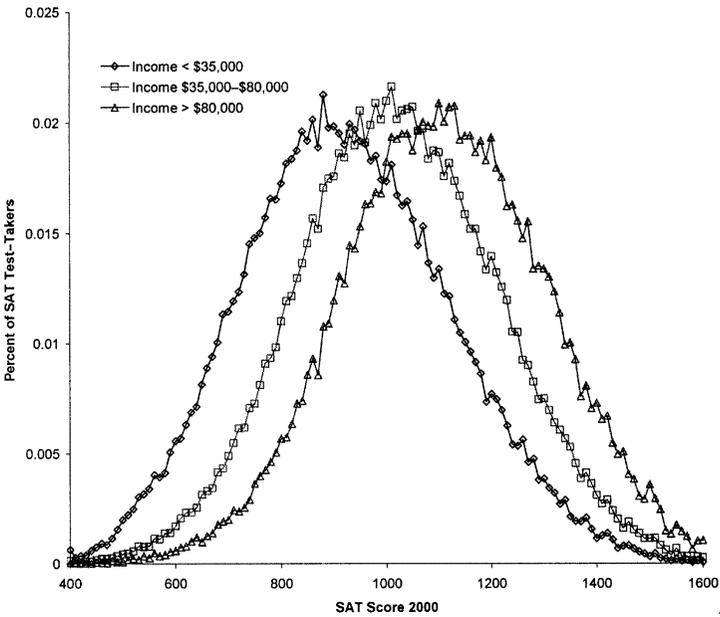
<sup>6</sup> As a point of reference based on the 2000 Census, 29 percent of families with 17-year-olds had income less than \$35,000, while 44 and 27 percent were in the middle and top groups, respectively.

Figure 1. Distribution of SAT test-takers by score and family income category, 2000

Panel A. Number of test-takers by family income



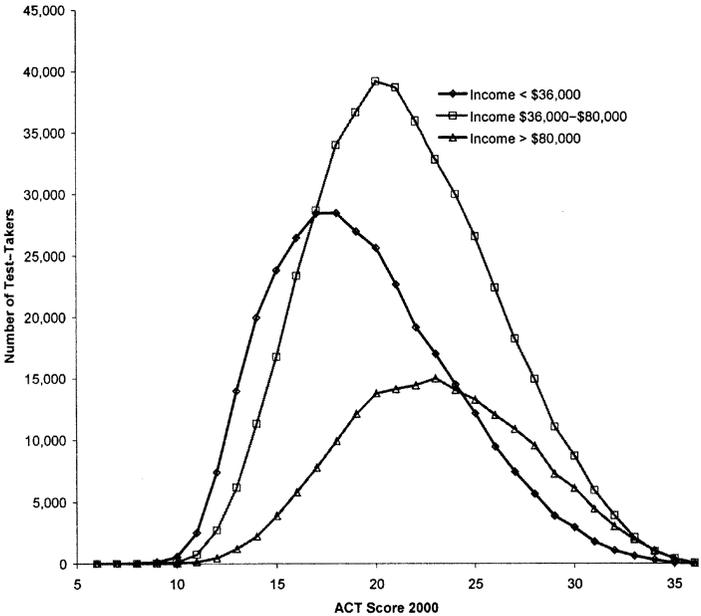
Panel B. Percent distribution of test-takers by family income



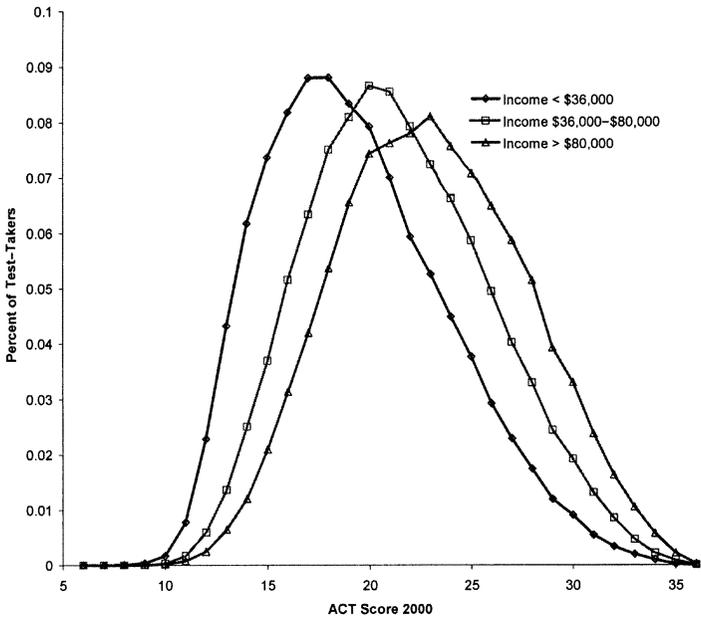
Source: Tabulations from SAT test-takers database.

Figure 2. Distribution of ACT test-takers by score and family income category, 2000

Panel A. Number of test-takers by family income



Panel B. Percent distribution of test-takers by family income



Source: Authors' tabulations from test-takers database.

striking, such differences are by no means uniform across states. Table 2 shows the distribution of SAT scores by state and income for those states for which the SAT is

the preferred standardized test of the state flagship (what we will call "SAT states"). The representation of low-income students among high-scoring students var-

**TABLE 2**  
DISTRIBUTION OF 17-YEAR-OLDS BY POVERTY STATUS, FAMILY INCOME AND STATE (2000)

State	% At or Below Poverty Line	Distribution by Family Income		
		% < \$35,000	% \$35,000– \$80,000	% > \$80,000
Alabama	15.2%	38.1%	42.6%	19.3%
Alaska	8.2%	22.3%	42.6%	35.1%
Arizona	13.4%	31.4%	42.4%	26.3%
Arkansas	14.8%	39.8%	44.7%	15.6%
California	14.5%	32.0%	38.8%	29.2%
Colorado	7.1%	23.4%	44.8%	31.8%
Connecticut	7.0%	18.9%	37.6%	43.5%
Delaware	8.3%	23.3%	41.5%	35.3%
Florida	11.6%	33.2%	43.6%	23.2%
Georgia	12.1%	31.1%	42.2%	26.7%
Hawaii	12.3%	25.8%	44.6%	29.6%
Idaho	9.3%	26.8%	54.1%	19.1%
Illinois	7.7%	21.9%	46.1%	32.0%
Indiana	6.8%	23.5%	50.0%	26.5%
Iowa	5.5%	22.5%	55.8%	21.7%
Kansas	7.5%	24.9%	51.6%	23.5%
Kentucky	14.2%	36.2%	42.5%	21.3%
Louisiana	20.8%	42.6%	39.3%	18.1%
Maine	7.9%	28.5%	52.2%	19.3%
Maryland	6.7%	19.8%	41.2%	39.0%
Massachusetts	8.0%	22.2%	38.7%	39.1%
Michigan	8.2%	24.2%	44.6%	31.2%
Minnesota	5.2%	18.0%	50.9%	31.1%
Mississippi	23.1%	48.6%	38.6%	12.9%
Missouri	10.5%	29.8%	47.7%	22.5%
Montana	13.1%	38.6%	47.6%	13.9%
Nebraska	6.8%	26.9%	54.7%	18.4%
Nevada	8.5%	25.6%	46.0%	28.4%
New Hampshire	4.1%	18.1%	46.2%	35.7%
New Jersey	7.6%	19.5%	37.4%	43.0%
New Mexico	15.6%	41.2%	42.7%	16.1%
New York	13.4%	31.0%	39.9%	29.0%
North Carolina	10.2%	31.2%	45.4%	23.5%
North Dakota	11.2%	31.5%	53.7%	14.9%
Ohio	7.7%	25.1%	46.4%	28.5%
Oklahoma	12.0%	36.6%	46.3%	17.1%
Oregon	8.4%	27.2%	46.8%	26.0%
Pennsylvania	8.4%	26.3%	47.1%	26.6%
Rhode Island	9.1%	23.6%	45.8%	30.6%
South Carolina	13.3%	35.2%	44.3%	20.5%
South Dakota	12.2%	35.9%	49.1%	15.0%
Tennessee	11.2%	32.7%	45.7%	21.6%
Texas	14.6%	34.4%	42.1%	23.5%
Utah	5.2%	16.9%	50.5%	32.6%
Vermont	6.2%	23.3%	54.5%	22.3%
Virginia	8.3%	26.2%	40.8%	32.9%
Washington	8.8%	25.1%	44.2%	30.7%
West Virginia	17.3%	41.8%	43.9%	14.2%
Wisconsin	5.8%	19.8%	53.3%	26.9%
Wyoming	8.4%	27.1%	53.5%	19.4%

Source: Authors' tabulations from the 2000 Decennial Census 5% Sample (Ruggles, Sobek, Alexander, Fitch, Goeken, Hall, King and Ronnander, 2004).

ies appreciably—to take one example, low-income students are about 21 percent of students scoring above 1200 on the SAT in California and about 14 percent of students scoring over 1200 in Virginia (with the national representation among SAT test-takers at about 18 percent). One implication is that, *ceteris paribus*, we would expect top-tier universities in California to draw from a pool of students that contains about 50 percent more low-income students than Virginia.

There are three reasons explaining state variations in the representation of low-income students at any level of performance: 1) states differ in their overall representation of relatively low-income students (differences in the distribution of income); 2) states differ in overall academic achievement; and 3) states differ in the extent to which precollegiate achievement is linked with income. It is because all three of these factors combine to generate the pool of students from different economic circumstances prepared to excel in college that we are particularly critical of efforts to rank and identify colleges from very different markets in their success (or failure) in attracting low-income students. Should university administrators really be held accountable for metrics driven by differences in local poverty rates or the performance of K–12 schools? What is more, state-level differences in achievement combine with variation in public flagship opportunities to impact the pool of students entering the national market served by many private colleges and universities.

To the first point, Table 2 shows the proportion of 17-year-olds (approximately college age) living in poverty and in the family income ranges of less than \$35,000, \$35,000 to \$80,000 and greater than \$80,000. Plainly, there are substantial differences across states in the concentration of poverty and relatively low-income potential college students—more than 40 percent of young people are from families

with incomes less than \$35,000 in Washington DC, Mississippi, New Mexico and Louisiana, while less than 20 percent of young people in New Hampshire, New Jersey and Connecticut come from families reporting income of less than \$35,000 in the 2000 Census (Table 2).

Adding to the variation across states generated by baseline differences in economic circumstances are the differences in performance in the precollegiate years. It is well known from standardized assessments like the National Assessment of Educational Progress (NAEP) that there are substantial differences in student performance by state (which are, in turn, correlated with the pattern of poverty presented earlier). As a point of comparison, we present state-level scores on the NAEP by eligibility for free and reduced price lunch (which should be seen as a proxy for poverty status) in Table 3. A first point to note is that there is substantial variation across states in overall scores. More significantly for this analysis, the gap in scores by economic status varies markedly by state. On the NAEP math examination, students in poverty scored about six percent lower than their classmates in Maine and New Hampshire, but 11–12 percent lower in Illinois, New Jersey and Maryland.

Variation across states in economic circumstances and precollegiate achievement would produce differences in the representation of low-income students at flagship universities in the absence of any policy differences affecting financial aid or recruiting. Equally important is that the heterogeneity in the representation of high-achieving poor students across states may significantly complicate calculations of the pool of low-income students that could easily be recruited to top private colleges and universities. Achieving high representation of low-income students at “national” colleges and universities necessarily implies moving students (or their choice of college) from states in which

**TABLE 3**  
 NAEP 8<sup>TH</sup> GRADE SCORES BY STATE AND FREE-LUNCH STATUS, 2000

Natl School Lunch Prog Eligibility	Mathematics		Reading	
	Eligible	Not Eligible	Eligible	Not Eligible
State				
Alabama	248	276	239	265
Alaska	264	287	241	267
Arizona	260	285	242	265
Arkansas	260	282	247	268
California	254	282	239	262
Colorado	261	290	248	272
Connecticut	255	292	243	272
Delaware	265	288	254	271
Florida	260	285	246	264
Georgia	257	285	243	269
Hawaii	251	276	239	256
Idaho	272	286	256	269
Illinois	258	290	248	273
Indiana	268	290	250	268
Iowa	269	290	255	272
Kansas	270	293	254	275
Kentucky	264	283	256	271
Louisiana	258	280	244	264
Maine	269	286	261	274
Maryland	258	287	243	269
Massachusetts	273	299	256	280
Michigan	258	285	246	267
Minnesota	270	297	252	275
Mississippi	253	279	241	266
Missouri	262	286	253	272
Montana	272	293	259	274
National Public	261	288	247	270
Nebraska	268	291	253	274
Nevada	256	277	240	259
New Hampshire	271	288	255	273
New Jersey	262	292	252	276
New Mexico	254	278	243	263
New York	267	291	253	276
North Carolina	266	293	244	267
North Dakota	274	292	260	274
Ohio	265	290	251	274
Oklahoma	260	283	252	267
Oregon	270	289	252	269
Pennsylvania	262	289	247	276
Rhode Island	252	282	243	269
South Carolina	267	294	246	268
South Dakota	276	294	259	274
Tennessee	256	282	246	268
Texas	268	293	247	269
Utah	268	284	254	266
Vermont	272	293	255	274
Virginia	263	292	253	273
Washington	269	294	251	272
West Virginia	259	278	245	263
Wisconsin	263	292	249	272
Wyoming	272	287	259	272

Source: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 2005 Mathematics Assessment. Table entries represent average scale scores, with the scale on each test ranging from 0 to 500.

low-income students are overrepresented to states or colleges in which low-income students are underrepresented. There are simply not enough high-achieving low-income students to generate "overrepresentation" of low-income students at some top colleges and equal representation of low-income students at others.

Hill and Winston (2005) are interested in the question of "are the numbers out there?" in understanding the underrepresentation of low-income students at the selective universities and colleges known as the Consortium on Financing Higher Education (COFHE) schools. Based on the observation that low-income students (defined as students with incomes below about \$32,500) are only about ten percent of the entering classes at these selective institutions, they consider the feasibility of increasing the representation of low-income students based on the national distribution of family incomes and test scores. Hill and Winston calculate that with a high-ability definition equivalent to an SAT score, COFHE schools would need to have a representation of low-income students at 16 percent to replicate the national distribution, implying "4,400 students would have to be matriculated each year from a low-income population of 19,959 or 22 percent of the national high-ability low-income population would be in COFHE schools." While Hill and Winston are optimistic about this target, we are considerably more skeptical based on the observation that over 27 percent of students achieving this high score are from California and (presumably) would have options including UC-Berkeley, UCLA, UC-San Diego and UC-Santa Barbara. What is more, a large number of other high-achieving, low-income students live in states like Michigan, Virginia and North Carolina, where the public universities are competitive with all but a few private colleges and universities. These data lead to some skepticism that the COFHE schools (in total)

could realistically capture one-quarter of the market for low-income students. In practice, the implication would be shifting many students from the University of California schools to selective schools in the Northeast.

We emphasize that the large differences between the low-income students and high-income students in precollegiate achievement—particularly, in the right tail—pose the largest challenge for increasing the opportunities for low-income students in the most resource-intensive colleges and universities. Whether college and university policies can contribute to the narrowing of these gaps remains an open question. We turn next to a different dimension of the problem: conditional on precollegiate achievement, are there indications that family income affects the pathway to selective schools defined in terms of sending achievement test scores to these institutions?

#### *Score Sending Differences by Family Income*

Do high-achieving low-income students know about opportunities at the most selective colleges and universities? The answer to this question depends substantially on where in the pool we look. We will start with a narrow version of the question, examining the information set in terms of knowledge of the state flagship university or other nationally ranked colleges and universities.

We ask two related questions: 1) to what extent do high achieving students demonstrate knowledge of the flagship university in their states, and 2) how frequently do students demonstrate interest in national colleges and universities? We are particularly interested in whether low-income students are less likely to demonstrate interest in these schools than their high-income peers.

We measure students' interest in a particular school by assessing whether

they send it their SAT or ACT scores. While sending test scores to a university does not guarantee that the student will eventually apply there, score-sending is a prerequisite of application. Moreover, to the extent that we are not only interested in which colleges students end up applying to, but also in which colleges students consider possible choices, score-sending data provides an important perspective. It allows us to observe interest from students who found a school sufficiently attractive as a choice to send their test scores there but did not finish applying.<sup>7</sup> Two margins—whether a student sent scores to the state flagship and whether a student sent scores to top private colleges and universities in the national market—are the focus of our empirical analysis.

We begin with some graphical presentations to illustrate the difference in score-sending by family income to state flagship universities. Figure 3 plots SAT or ACT scores on the x-axis and the proportion of students from the indicated state sending a score to the state flagship, with these series distinguished by family income, on the y-axis. The presentations make the general point that it is measured student performance, not income, that is the strongest indicator of sending scores to the state flagship and that there is a clear tie between score-sending and test scores. (In nearly all of the graphs, there is considerable variability at the top tail, representing the small number of underlying observations.) There are some noteworthy differences among states: consider the comparison of the University of California—Berkeley (top left) and the University of Virginia (bottom right). In California, low-income students are actually somewhat *more likely* (particularly in

moderate score ranges) to send their scores to the flagship, while for the University of Virginia, there is a “gap” in score-sending in the 1200 to 1400 range, with low-income students somewhat less likely to send scores than high-income students.

As many of the students that the University of Virginia and the University of California—Berkeley admit score between 1200 and 1400 on the SAT (the 25<sup>th</sup> and 75<sup>th</sup> percentile of math and verbal scores of enrolled students are 610 and 720 and 600 and 700, respectively), differences in score-sending by students in this range could potentially have a big effect on the composition of students in the entering class. That is, if low- and high-income students have similar probabilities of admission based on their SAT score and are equally likely to apply given that they sent the college their SAT scores, this gap in score-sending would lead to a marked underrepresentation of low-income students in the University of Virginia’s pool of admitted students. Meanwhile, in California, the disparity in application behavior would lead low-income students to be overrepresented among UC—Berkeley’s admission pool.

Regression analysis allows us to identify more precisely the difference in the propensity of students with different family incomes to send test scores to the state flagship. Tables 4 and 5 report the results of regressions of whether a student sent his or her test scores to the state flagship based on test score-income interaction terms, with dummy variables for race and state fixed effects also included in the specification. Table 4 uses SAT data and is limited to states in which the SAT is the dominant test, while Table 5 uses ACT data and is limited to states in which

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<sup>7</sup> Avery and Kane (2004) find that students from more affluent schools are substantially more likely to apply to a four-year college than their counterparts at poorer schools even conditional on taking the SAT, having a GPA above a 3.0, and planning to attend a four-year school. Thus, examining what colleges students show they are interested in when they take the SAT or ACT may provide a more accurate picture of what colleges are on their radar screen than would examining what colleges they actually apply to.

Figure 3. Score sending to state flagship universities by score and income, selected states, 2000  
Panel A. SAT States

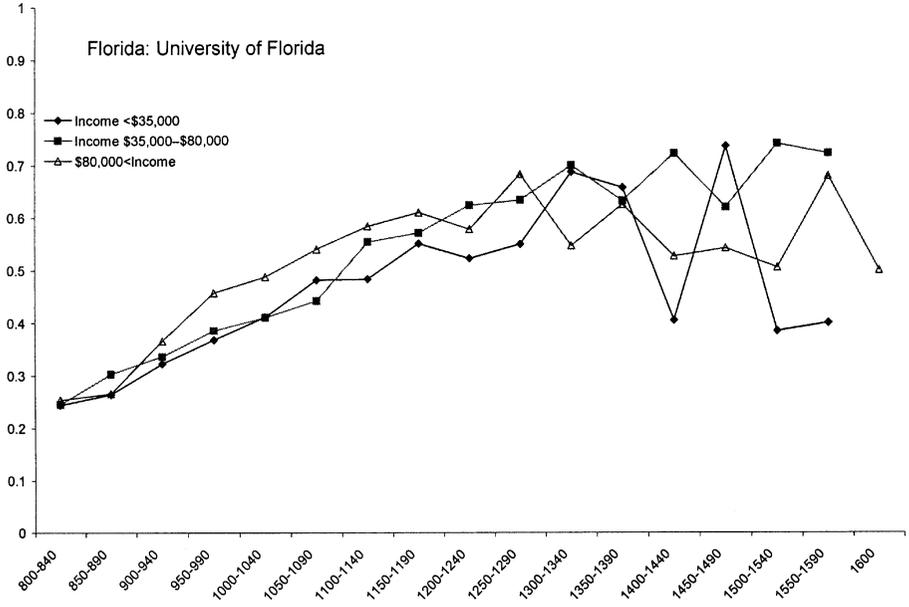
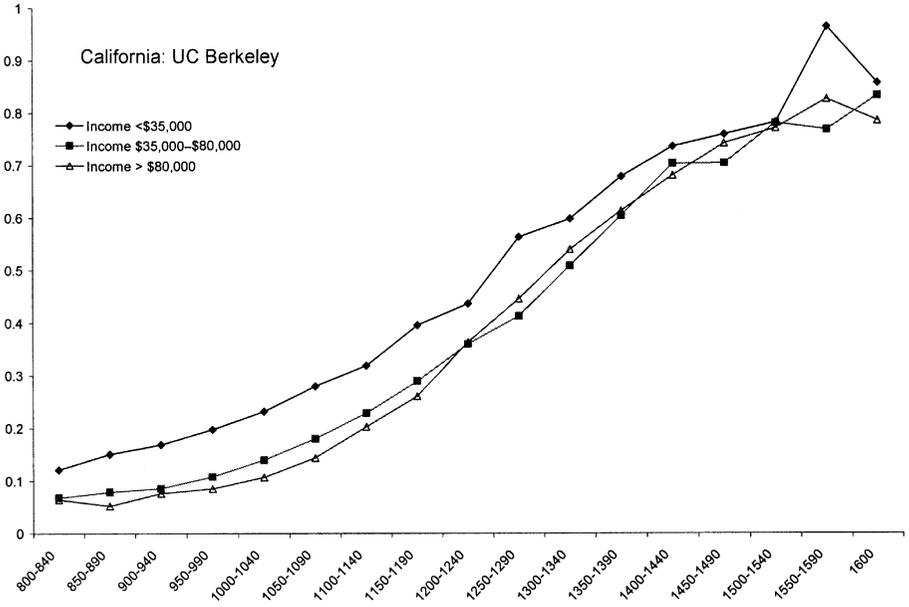


Figure 3. Continued  
 Panel A. SAT States

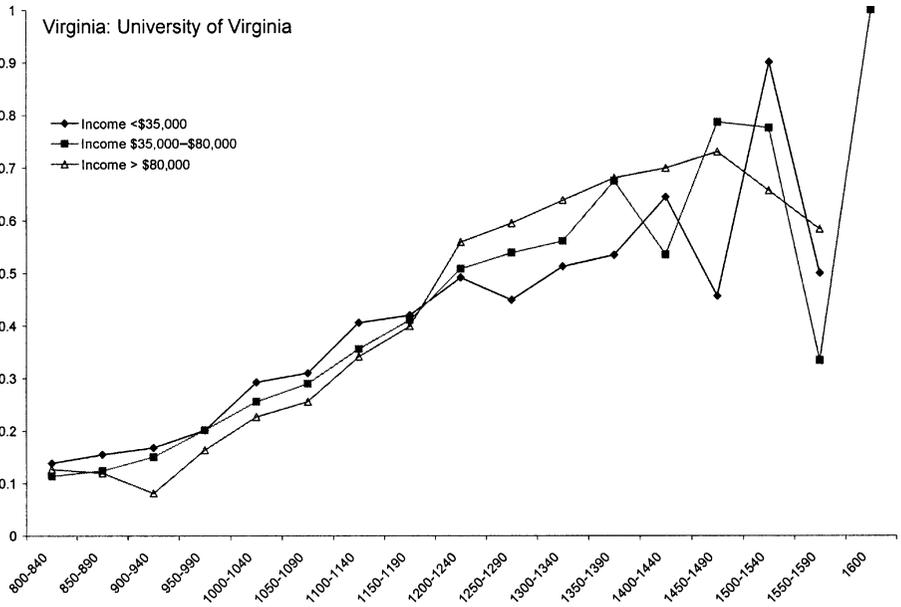
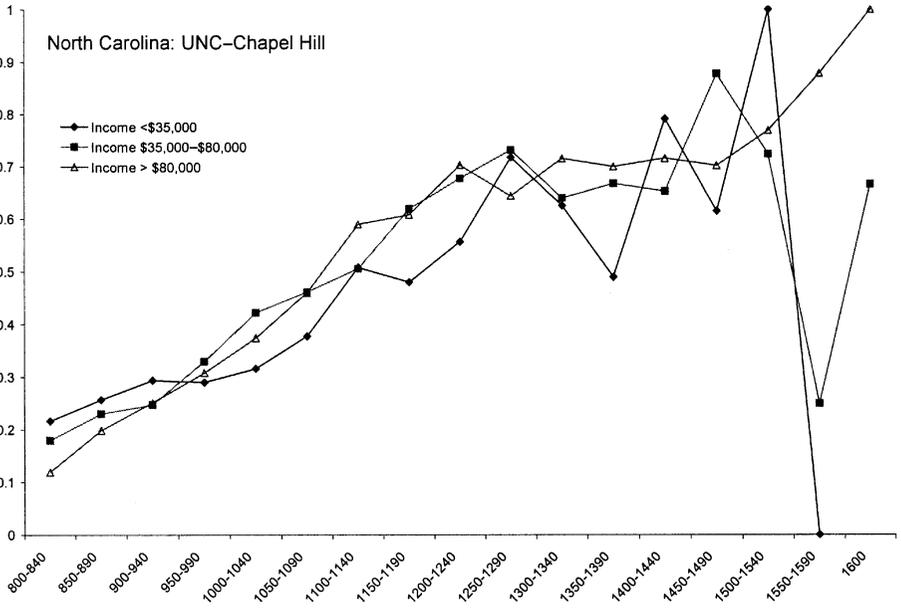
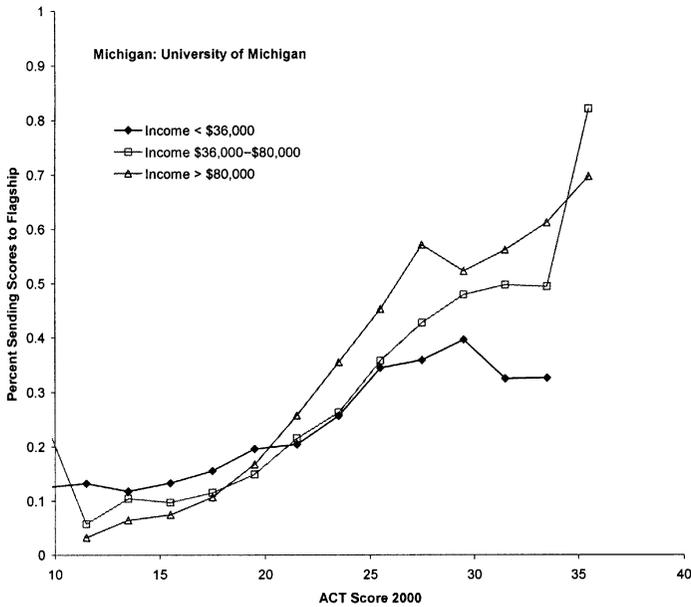
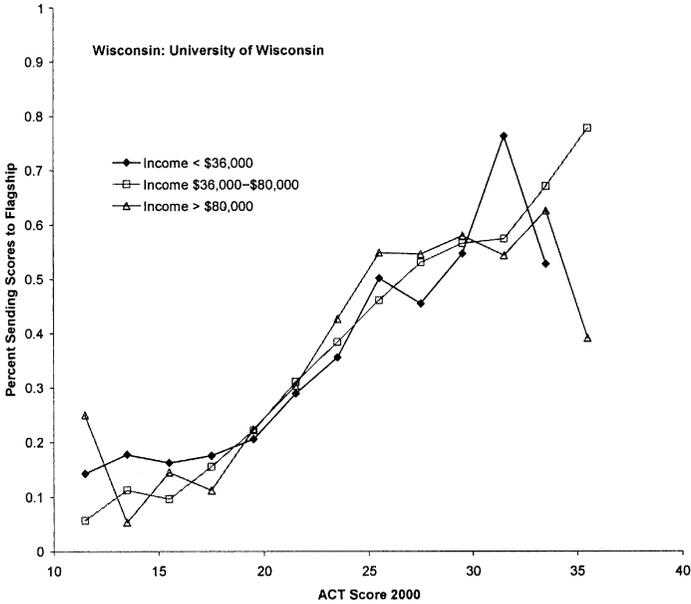


Figure 3. Continued  
Panel B. ACT States



**TABLE 4**  
REGRESSION ESTIMATES OF THE EFFECT OF INCOME ON SCORE-SENDING  
TO A FLAGSHIP UNIVERSITY, 2000 [SAT STATES]

Panel A. Test-takers in all SAT states			
SAT	SAT x Income < \$35,000	SAT x Income \$35,000–\$80,000	SAT x Income > \$80,000
< 800	Omitted	–0.015 (0.007)	–0.029 (0.014)
800–900	0.054 (0.009)	0.044 (0.014)	0.037 (0.020)
900–1000	0.107 (0.015)	0.101 (0.020)	0.099 (0.029)
1000–1100	0.158 (0.025)	0.160 (0.026)	0.172 (0.039)
1100–1200	0.219 (0.034)	0.219 (0.033)	0.217 (0.042)
1200–1300	0.264 (0.050)	0.262 (0.043)	0.275 (0.048)
1300–1400	0.317 (0.072)	0.302 (0.054)	0.296 (0.061)
1400–1500	0.324 (0.102)	0.311 (0.076)	0.321 (0.083)
1500–1600	0.386 (0.112)	0.360 (0.077)	0.290 (0.106)
Panel B. Test-takers in all SAT states, excluding California			
SAT	SAT x Income < \$35,000	SAT x Income \$35,000–\$80,000	SAT x Income > \$80,000
< 800	Omitted	–0.012 (0.009)	–0.025 (0.017)
800–900	0.054 (0.012)	0.052 (0.017)	0.049 (0.022)
900–1000	0.107 (0.020)	0.112 (0.023)	0.117 (0.031)
1000–1100	0.154 (0.031)	0.171 (0.031)	0.193 (0.042)
1100–1200	0.205 (0.039)	0.224 (0.041)	0.227 (0.051)
1200–1300	0.227 (0.046)	0.254 (0.052)	0.264 (0.058)
1300–1400	0.253 (0.060)	0.270 (0.056)	0.254 (0.061)
1400–1500	0.223 (0.067)	0.245 (0.061)	0.249 (0.067)
1500–1600	0.274 (0.082)	0.292 (0.062)	0.184 (0.069)

Notes: Each panel represents the estimates from a linear probability regression of score-sending to a state flagship on a full set of interactions between SAT range and income level. Regressions also include state fixed effects and gender and race covariates.

**TABLE 5**  
REGRESSION ESTIMATES OF THE EFFECT OF  
INCOME ON THE PROBABILITY OF APPLYING  
TO A FLAGSHIP UNIVERSITY, 2000 [ACT STATES]

ACT	ACT x Income < \$36,000	ACT x Income \$36,000– \$80,000	ACT x Income > \$80,000
< 15	Omitted	0.024 (0.006)	0.035 (0.012)
16–18	0.068 (0.005)	0.087 (0.005)	0.106 (0.008)
19–21	0.137 (0.005)	0.158 (0.005)	0.179 (0.006)
22–24	0.183 (0.006)	0.216 (0.005)	0.244 (0.006)
25–27	0.218 (0.007)	0.259 (0.005)	0.260 (0.007)
28–30	0.235 (0.009)	0.258 (0.007)	0.249 (0.008)
31–33	0.254 (0.016)	0.248 (0.010)	0.213 (0.011)
34–36	0.222 (0.050)	0.189 (0.025)	0.205 (0.025)

Notes: Each panel represents the estimates from a linear probability regression of applying to the state flagship on a full set of interactions between ACT range and income level. Regressions also include state fixed effects and gender and race covariates.

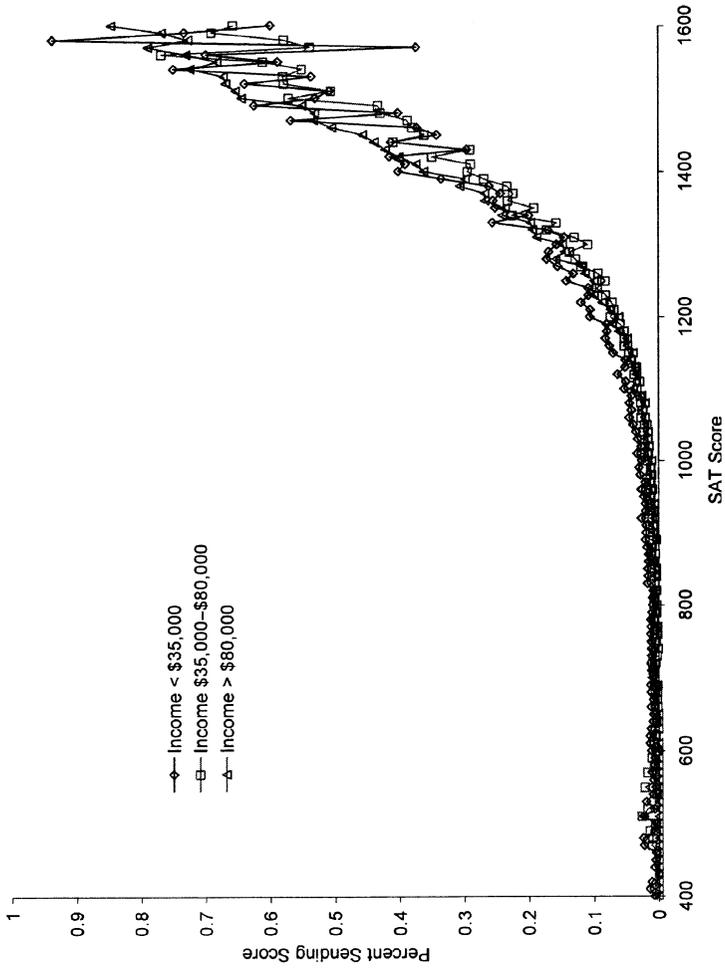
the ACT is the dominant test. In the top panel of Table 4, we use all states for which the SAT is the dominant test. The relative equality of coefficients within rows suggests that for any test score, family income has little effect on the probability of sending scores to the state flagship, though differences between rows in scores have a substantial effect on score-sending. Yet, it turns out that this result is quite sensitive to the unusual case of California. Further investigation of this “equality” result in the bottom panel, which presents the same estimation excluding observations from California, yields a somewhat different conclusion. Among states outside of California, there are substantial differences between low-income and high-income students appearing outside the very top

SAT bins in the propensity to send scores to the state flagship.

This same result, with near parity at very top scores and a gap between low-income and high-income test-takers, appears for the ACT flagship universities (Table 5). In states where the ACT is dominant, this difference exists only as long as students’ scores are below 28 (equivalent to below a 1240 on the SAT), while in SAT states this difference exists for students who have SAT scores as high as 1500. The difference is substantial: high-income students in the 1200–1300 SAT range are over 25 percent more likely to send scores to their state flagship, while high-income students in the 25–27 ACT bracket are 19 percent more likely. Even though this difference reverses for higher test scores, with low-income students more likely to apply to the flagship, this difference at lower test scores may impact the composition of the entering class. The test-score ranges in which we observe low-income students under-represented in score-sending coincide with the academic ranges of these schools.

A related question is the extent to which students from all income groups—and low-income students in particular—are acquainted with the opportunities afforded by top-tier national universities. Figure 4 suggests a very selective look at this question, plotting the proportion of students by income and SAT sending scores to Harvard, Princeton, Yale, and Stanford. The lines for different income groups in this graph are nearly overlapping, rising steeply beyond 1300. Moreover, what is striking is the relatively high fraction of students—over 70 percent at the top of the score distribution—sending their scores to these schools. Such data suggest that the very high-achieving student who is simply unaware of national university opportunities is likely to be very rare. We expand this analysis to consider score-sending to a broader set of national universities in Table 6. Taking note of the

Figure 4. Overall score-sending to top four schools, 2000 SAT



Source: Top four schools include Harvard, Princeton, Yale and Stanford. Tabulations from SAT Test-takers database.

**TABLE 6**  
REGRESSION ESTIMATES OF THE EFFECT OF INCOME ON  
SCORE-SENDING TO TOP-RANKED COLLEGES AND UNIVERSITIES, 2000

Panel A. Send scores to a Top 20 University

SAT	SAT x Income < \$35,000	SAT x Income \$35,000–80,000	SAT x Income > \$80,000
< 800	Omitted	-0.002 (0.002)	-0.008 (0.002)
800–900	0.035 (0.002)	0.018 (0.002)	0.009 (0.002)
900–1000	0.070 (0.002)	0.039 (0.002)	0.031 (0.002)
1000–1100	0.128 (0.003)	0.085 (0.002)	0.082 (0.003)
1100–1200	0.213 (0.004)	0.166 (0.003)	0.183 (0.003)
1200–1300	0.352 (0.007)	0.306 (0.004)	0.366 (0.005)
1300–1400	0.508 (0.011)	0.504 (0.006)	0.594 (0.006)
1400–1500	0.690 (0.018)	0.679 (0.010)	0.785 (0.007)
1500–1600	0.770 (0.035)	0.831 (0.015)	0.886 (0.009)

Panel B. Send scores to a Top 20 Liberal Arts College

SAT	SAT x Income < \$35,000	SAT x Income \$35,000–80,000	SAT x Income > \$80,000
< 800	Omitted	0.001 (0.001)	0.003 (0.001)
800–900	0.003 (0.001)	0.003 (0.001)	0.005 (0.001)
900–1000	0.009 (0.001)	0.008 (0.001)	0.011 (0.001)
1000–1100	0.021 (0.001)	0.014 (0.001)	0.025 (0.001)
1100–1200	0.035 (0.002)	0.036 (0.001)	0.056 (0.002)
1200–1300	0.079 (0.004)	0.078 (0.002)	0.125 (0.003)
1300–1400	0.141 (0.008)	0.145 (0.004)	0.212 (0.005)
1400–1500	0.215 (0.016)	0.237 (0.009)	0.291 (0.008)
1500–1600	0.251 (0.036)	0.289 (0.018)	0.315 (0.014)

Notes: Each panel represents estimates from a linear probability regression of score-sending to the indicated type of institution on a full set of interactions between SAT range and income level. Regressions also include state fixed effects and gender and race covariates.

estimates of the joint effect of income and test scores, it is unambiguously clear that higher scores increase the probability of sending test scores to one of the top 20 private universities.<sup>8</sup> What is also clear in the inspection of the estimated effects is that there are some differences between low- and high-income students in the likelihood of application in the ranges above 1300, with low-income students less likely to apply to selective universities than their high-income peers by about 15 percent in the 1500–1600 range.

The bottom panel of Table 6 turns to the question of application to the top liberal arts colleges. These might be thought of as competitors to private research universities in that they are often similarly selective in admissions (though smaller in scale) and charge prices that are very similar to those charged by the most selective universities. Estimating parallel linear probability models of the likelihood of sending test scores to one of the top ten, top 20, or top 30 liberal arts colleges produces appreciably larger differences by family income than do similar models restricted to the top national universities or state flagship institutions. In the context of the top 20 liberal arts colleges, it is in the SAT ranges from 1100–1400 where the difference in score-sending between those in the top and bottom income groups consistently exceeds 40 percent. It remains an open—and significant—question as to the source of this difference. Is it that low-income students are less likely to have heard of Swarthmore, Wellesley and Carleton? Or do students expect to feel ill at ease in these environments? Or could they just simply prefer the bigger-name national universities?

The comparison of score-sending to public universities, nationally ranked universities and liberal arts colleges suggests that the importance of application patterns and information as an explanation

of the underrepresentation of low-income students differs appreciably across these institution types. The margin for increasing enrollment through more information is likely to be much more limited at the public universities than at the small liberal arts colleges. Nevertheless, we want to emphasize that California is a particular outlier in our review of score-sending to public universities. While differences in score-sending to flagships by family income are not very large at the top of the distribution, there are gaps in moderate test-score ranges, which are well within the admission profiles of many selective institutions.

## RECENT POLICY INNOVATIONS AND EXPECTED EFFECTS

In recent years, a number of the selective colleges and universities have recognized that low-income students are unacceptably underrepresented at their institutions and are asking what can be done to increase opportunity. While the provision of need-based financial aid has been a benchmark policy for many decades in many selective colleges and private universities, recent policy changes represent a shift from relatively passive accommodation of low-income students to proactive efforts to expand the representation of low-income students in the most resource-intensive colleges and universities (Pallais and Turner, forthcoming).

Among the first such programs was the Carolina Covenant at the University of North Carolina (introduced in 2003), which committed the University to meet full demonstrated need for students with family incomes within 200 percent of the poverty line (\$37,700 for a family of four in 2005–06), through scholarships, grants, and work study. Shortly thereafter, AccessUVa (introduced in 2004) committed to meet the financial need of very low-income students through grants

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<sup>8</sup> This analysis is quantitatively similar when we consider only the top ten or the top 30 private universities.

and scholarships alone. In addition to the financial aid component, these programs include substantial outreach and recruiting efforts. For example, public service announcements about AccessUVa were distributed to 16 Virginia television stations, 68 Virginia radio stations, and 96 daily and weekly Virginia newspapers, while representatives of the University of Virginia's admission office visited 117 high schools with primarily low-income student bodies in fall of 2004 that it did not visit in the fall of 2003. Other state programs are somewhat less generous but, nonetheless, represent affirmative commitments to improve the representation of low-income students.<sup>9</sup>

Private universities soon followed and, most prominently, Lawrence Summers, then president of Harvard, delivered an address at a February 2004 meeting of the American Council on Education in which he described the "manifest inadequacy of higher education's current contribution to equality of opportunity in America." Summers went on to announce a new Harvard Financial Aid Initiative designed to encourage the enrollment of students from low- and moderate-income families. Under this initiative, Harvard committed to cover the entire cost of attendance for students with family incomes less than \$40,000 through grants and work-study and reduce the required contribution from students with family incomes between \$40,000 and \$60,000.<sup>10</sup> Harvard was not the only university—nor even the first—to introduce policies intended to increase the representation of low-income students.

In 2001, Princeton implemented large changes in its financial aid policies; it

eliminated loans for all students beginning in the fall of 2001. Then, after Harvard announced its Financial Aid Initiative in February, 2004, a wave of universities followed suit. The following October, Brown announced that it would eliminate loans for its neediest students. Yale committed to covering the entire cost of attendance for students with family incomes less than \$45,000 through grants and a work-study contribution in March, 2005. It also announced a reduction in the required contributions from families with annual incomes between \$45,000 and \$60,000. In March, 2006, the University of Pennsylvania announced it was eliminating loans for economically disadvantaged students with family incomes below \$50,000 per year, Stanford announced it was eliminating the parental contributions for students with family incomes less than \$45,000 and halving the required parental contributions for students with family incomes between \$45,000 and \$60,000, and the Massachusetts Institute of Technology announced it would match the Federal Pell Grant for all students winning Pell awards. In the same month, Harvard increased the scope of its Financial Aid Initiative, eliminating the parental contributions for families with incomes between \$45,000 and \$60,000 and reducing the contributions for families with incomes up to \$80,000 per year. The bottom line is that there has been a remarkable wave of public competition among the most elite institutions in efforts to advertise their commitment to high-achieving low-income students. Because each of these institutions had comprehensive need-based aid programs in place before announcing

<sup>9</sup> The University of Illinois' Illinois Promise, for example, only eliminates loans for students with family incomes under the poverty line. There is more variation among public university initiatives, with programs like M-Pact at Michigan focusing more on increasing the generosity of aid to a range of low-income students than eliminating loan burdens entirely. It should also be noted that at the University of Michigan, administrators are concerned with addressing the somewhat higher attrition rates of low-income students in addition to expanding enrollment opportunities.

<sup>10</sup> Harvard's Financial Aid Initiative also included expanded recruiting, a renewed emphasis on considering family circumstances in the admission process, and new efforts to deepen the pipeline of prospective students.

new initiatives, it is quite difficult to assess incremental resources attached to these new programs.

In all cases, the universities are making a direct and public case that a college education is affordable to low- and moderate-income students. At the same time, our analysis makes clear that the constraints and challenges faced by flagship state universities differ markedly from those faced by private universities that recruit their students from a national market. Because most of the new institutional initiatives to increase the representation of low-income students have been in place for only a short period of time, it is far too early to evaluate their effects on outcomes such as collegiate attainment or graduation rates. However, preliminary evidence suggests that enrollment behavior does respond to these incentives.

There is no question that AccessUVA led to an increase in the enrollment of low-income students in its first year. The number of students with family incomes less than 200 percent of the poverty line who applied to the University increased by 10.4 percent, though this increase was only slightly larger than the overall increase in applications. It was in the admissions and matriculation (the decision to attend conditional on admission) margins where substantial changes occurred as the number of entering low-income students increased from 133 to 200 between the fall of 2004 and the fall of 2005 (Tebbs and Turner, 2006).

Similarly, the Harvard Financial Aid Initiative appears to have generated an increase in the number of low-income students among first-year students in the fall of 2006 (Avery, Hoxby, Jackson, Burek, Poppe, and Raman, 2006). The percentage of enrolled freshmen with family incomes

below \$60,000 increased from 14.9 to 16.5 percent in the program's first year, almost entirely due to the increase in applications from students from low- and moderate-income families. (The percentage of applicants from families with incomes less than \$60,000 increased from 12.5 to 14.5 percent in the Initiative's first year.)

In evaluating the extent to which these colleges and universities have increased opportunities for low-income students with financial aid and outreach, it is important to focus on outcomes beyond initial college enrollment. The investigation of whether low-income students face additional hurdles to graduation conditional on enrollment is an important avenue for future work.

Colleges and universities can use a number of policy levers to increase the representation of low-income students. The presence of differences in score-sending by family income suggests that there is some margin for improvement for schools (particularly private colleges) to increase the pool of highly qualified applicants from low-income families. Other initiatives (for which we are able to present less data in this paper) include differential consideration of low-income students in the admission pool and increased financial aid.<sup>11</sup> In the discussion below, we consider how such policies may have very different effects by type of institution. Our overriding conclusion is that differences in institutional circumstances necessitate different policies across institutions; in effect, efforts to encourage all institutions to adopt the same policies would be inefficient. Even without evaluation results, our analysis illustrates how differences in market conditions lead to very different challenges for private and public universities.

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<sup>11</sup> Bowen, Kurzweil, and Tobin (2005) recommend that selective colleges and universities essentially "put a thumb on the scale" in considering the admission of students from families with low socioeconomic status, which would have the effect of increasing the probability of admission for low-income students in relatively high ranges of academic performance. In discussing recent changes at Harvard, Avery et al. (2006) note that in evaluations, the admission review attempted to take into consideration the more limited opportunities for the development of a full extracurricular portfolio among low-income students.

*The Market for Students: State versus National Pools*

The U.S. market for higher education is peculiar in that while there is substantial competition between public and private universities for faculty and research grants, public and private universities define their student “markets” somewhat differently, with state universities generally restricted to drawing at least a sizeable proportion of their students from within state. In contrast, over the last half century, private universities have drawn from an increasingly national and geographically integrated market for students.<sup>12</sup>

Private colleges and universities position their recruitment in the national (and, increasingly) international market for the best undergraduate students. Public flagships draw substantially from within state. The difference has striking implications for the implementation of policies designed to increase the enrollment and attainment of low-income students. For public universities, the geographical focus of the primary “market” for students at the state level naturally allows for somewhat greater targeting of an informational message than when the student market is defined nationally. However, a challenge faced by public universities is that policies that address the underrepresentation of low-income students in the admission process in their context are likely to entail a larger cost at the margin than would be the case for private national universities.<sup>13</sup>

Consider a very simple model starting with only two universities, both sharing the objective of increasing the number of matriculating low-income students by  $X$ . We assume that both schools are *ex-ante*

admitting students at the same margin (for simplicity measured by SAT score) and that the schools can only attract new students from below the margin; that is, the schools are unable to steal students from each other. Also assume that the state university is only able to admit more low-income students from within the state, while the national university can recruit from across the country. We assume the distribution of low-income students is the same in the state and nationally, though the number of students in the national distribution ( $N_N$ ) is greater than the number of students in the state distribution ( $N_S$ ). Define  $F(\cdot)$  as the cumulative distribution function of test scores for the low-income population. Define  $SAT_N$  and  $SAT_S$  as the respective new admission cutoffs for the national and state university used to increase the number of matriculating low-income students by  $X$ ;  $\underline{SAT}$  is the initial threshold for admission.

The national university finds  $SAT_N$  to satisfy  $N_N(F(\underline{SAT}) - F(SAT_N)) = X$  and the state university finds  $SAT_S$  to satisfy  $N_S(F(\underline{SAT}) - F(SAT_S)) = X$ . Setting these two equations equal to one another and building on  $N_N > N_S$ , it is straightforward to show:

$$\begin{aligned}
 F(SAT_N) - F(SAT_S) &= \frac{X}{N_S} - \frac{X}{N_N} \\
 &= X \left( \frac{1}{N_S} - \frac{1}{N_N} \right) = X \left( \frac{N_S - N_N}{N_S N_N} \right).
 \end{aligned}$$

The result is that for otherwise identical state and national universities, increases in the representation of low-income students through the admissions margin come at different costs, with the difference a function of the difference between the size of the national pool and the state pool

<sup>12</sup> Hoxby (1997) discusses the increasing stratification of higher education in the post-World-War-II period, with increasing national integration in the market for higher education particularly among private colleges and universities.

<sup>13</sup> In effect, the “thumb on the scale” may need to be heavier to achieve the same outcome for public universities than private universities.

(the bigger the difference in pool size, the bigger is the difference in the admission margin). This gap will also increase as the desired increment in enrollment ( $X$ ) increases.

Consider the size of the pool of low-income students in the entire country and in an individual state. The national pool dwarfs the state pool at all test scores, including high test scores, where many of the flagship- and national-university students score.<sup>14</sup> One reader of an early draft of this paper asked, “why can’t the handful of elite publics act just like the privates” operating in the national market for student recruiting. The cost for elite publics of choosing this path is that state funders (politicians) may expect the institution to invest particularly in increasing low-income enrollment from state residents.

The point of this exercise is that the effective policies for increasing the representation of low-income students may differ dramatically between private universities and state flagship universities. The former may find much success in outreach efforts that work on the margin of increasing applications from demonstrably well-prepared students from low-income families. For public universities, identifying well-qualified students from the existing in-state pool of high-school students who are not already applying to the state flagship or other top schools may have some—though more limited—returns. To this end, public universities charged with increasing the enrollment of low-income students may focus on different margins including attempts to increase the “pool” or preparation within state, admissions strategies that look to identify low-income students with the potential to succeed, or recruitment efforts to increase ma-

trication among those students already admitted.

Looking forward, an interesting question about efforts to increase the representation of low-income students at top public and private institutions is how such efforts will affect the total number and distribution of low-income students in the top tier of colleges and universities. In a revealing comment about the effects of the new Harvard University initiative, Caroline Hoxby noted, “In the short term, we have to face the fact that these kids who get into Harvard would not otherwise be going to a community college, they may be going to the University of Michigan’s honors program” (Bombardieri, 2005). In effect, greater efforts by private universities to increase opportunities for low-income students will likely expand the number of low-income students exploring college choice in the national market for higher education. We would expect some shifting of students, with students from less-selective privates and, more likely, state flagship universities considering top universities as these institutions begin to recruit aggressively to increase their representation of low-income students. Moreover, one would expect such changes to vary considerably by state: states with very strong public universities would have only a few low-income students drawn into the national market by the most highly ranked universities while low-income students in other states would face much stronger draws from the national market.

## CONCLUDING COMMENTS

Low-income students are underrepresented in the entering classes at many of the most resource-intensive institutions in the U.S. higher education system, includ-

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<sup>14</sup> In our calculations, the national pool of low-income students with scores over 1200 (a rough threshold for selective admission) exceeds the Virginia pool by a factor of about 36! As 50 percent of the low-income students in Virginia with SAT scores over 1200 already send their scores to the University of Virginia, it is likely to be much more difficult to attract students from the existing in-state pool than from the national pool.

ing state flagship universities, top-ranked private universities and top-ranked liberal arts colleges. The strong link between economic circumstances and indicators of college preparation is a substantial and entrenched barrier limiting opportunities for low-income students and, potentially, exacerbates intergenerational inequality. One can hope, though not definitively predict, that reforms in elementary and secondary education combined with the promise of generous financial aid at the best colleges and universities will help to close gaps by family income in precollegiate preparation.

Yet, it is also clear that the underrepresentation of low-income students in many state flagship universities and top-ranked private institutions extends beyond predictable differences in preparation. As indicated by the analysis of where students send scores, it is clear that all but the very top low-income students tend to be less likely to demonstrate interest in these colleges and universities, with the underrepresentation particularly marked among the private liberal arts colleges.

In thinking through how the distribution of students may adjust to aggressive institutional efforts, we want to emphasize the importance of recognizing differences among states in expected outcomes. There is a substantial intersection between the markets for state flagship universities and private colleges and universities; aggressive efforts by private institutions to recruit low-income students will likely draw students from state flagship universities. At the same time, flagship universities are likely to face increased pressure from state legislators to demonstrate their commitment to providing opportunities for low-income students. Without question, low-income students will benefit from this competition. While this competition will clearly increase aid offers and improve opportunities for the relatively small number of low-income students already attending flagship universities and selective private

universities, it remains to be seen whether these policies may also affect the extensive margin by dramatically increasing precollegiate performance and the eventual representation of low-income students in the most resource-intensive colleges and universities.

Initiatives to expand the pool of applicants, provide an advantage for low-income students in admission, and increase financial aid are margins at which colleges and universities may initiate policies to improve outcomes. Yet, given that only a modest number of public and private universities have the resources to meet the financial need of all students, it seems unlikely that significant changes in the representation of low-income students among a large number of top colleges will occur without additional financial support from state and federal sources. What is clear from this analysis is that the challenges faced by public universities, with the expectation of serving many undergraduates from the state, are quite different than those faced by private colleges and universities operating in a national market.

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