Robert M.
La Follette School of Public Affairs
at the University of Wisconsin-Madison

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Matthew P. Steinberg
La Follette School of Public Affairs, University of Wisconsin-Madison

Patrizio Piraino
University of Siena, Italy; and Institute for Research on Poverty, University of Wisconsin-Madison

Robert Haveman
La Follette School of Public Affairs, University of Wisconsin-Madison

Robert M. La Follette School of Public Affairs
1225 Observatory Drive, Madison, Wisconsin 53706
Phone: 608.262.3581 / Fax: 608.265-3233
info@lafollette.wisc.edu / http://www.lafollette.wisc.edu

ACCESS TO HIGHER EDUCATION:

Exploring the Variation among Research Universities in the Prevalence of Pell Grant Recipients

Matthew P. Steinberg

Patrizio Piraino

Robert Haveman

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Matthew Steinberg is a graduate student at the La Follette School of Public Affairs, University of Wisconsin-Madison. Patrizio Piraino is a graduate student at the University of Siena, Italy, and a visiting scholar at the Institute for Research on Poverty, University of Wisconsin-Madison. Robert Haveman is Professor Emeritus of Economics and Public Affairs, University of Wisconsin-Madison. Financial support for this paper comes from a grant from the Mellon Foundation.

I. Introduction

Concerns regarding access to and economic diversity in U. S. higher education are increasingly on the public policy agenda. Although the combination of increasing tuition and decreasing state support has made this issue most pressing for public institutions, qualified students from middle and lower income families are facing a financial 'squeeze' that limits their access to both public and private higher education. Indeed, evidence shows that the distribution of higher educational opportunities in the U. S. has become increasingly concentrated on students from families with high income and wealth. (Haveman and Wilson, 2007)

The private and social benefits of a college education are well-documented. For the individual, additional educational attainment leads to higher earnings as well as a variety of other nonmarketed benefits, including improved consumer choices and better health. At the societal level, additional investment in higher education is associated with greater community involvement, reduced unemployment, reduced crime, and increased charitable contributions of time and money.[1] These social and private benefits, in turn, are of value to other important institutions, such as governments at all levels. Because of these gains, tax revenues are increased and expenditures on welfare and assistance programs are reduced (Couturier, 2006).

The goal of expanding access to college for youths from middle and lower income families is high on the agenda of higher education policymakers. However, limited availability of data regarding the income distribution of students in specific colleges and universities has resulted in relatively little information about the participation rate of low-income students across U.S. higher education institutions (Heller, 2004).

This paper attempts to address this information gap by focusing on the prevalence of undergraduate students supported by a Pell Grant—a universal grant targeted to low-income students—as a measure of the economic diversity of colleges and universities. While the variation in the prevalence of Pell Grant recipients has been well documented elsewhere (Heller, 2004; Mortenson, 2004), we are not aware of studies that have provided an analytical framework in which to interpret this value as an indicator of the extent of economic diversity among U.S. higher education institutions.

[1] Ashenfelter, et al. (1999) summarize the research evidence regarding the earnings effects of marginal investments in education. Evidence on the non-marketed, external and public goods effects of a college-educated citizenry is found in Haveman and Wolfe (1984) and Wolfe and Haveman (2003).

In this paper, we treat such needs-based financial assistance as an indicator of the prevalence of low-income students attending institutions of higher education across the United States. We identify independent institution- and state-specific factors potentially related to the prevalence of Pell recipients among U.S. research universities, and find that a substantial proportion of the variation in this outcome can be explained by these factors. We make use of these estimated relationships to assess the prevalence of low-income students among both public and private institutions.

The paper is structured as follows. Section II gives a brief overview of the evolution in the financing of higher education in the U. S., and describes the Federal Pell Grant Program. Section III spells out the fundamental research questions addressed in this paper. Section IV describes the sample of institutions included in the empirical analysis. Section V presents the model and describes explanatory variables on which we concentrate. Section VI presents the empirical results, and Section VII concludes.

II. Recent trends in higher education finance

A more educated citizenry benefits both individuals and the society; however, recent trends in the cost of and the financing of higher education have impeded the realization of these benefits. In 2003-04, a college student attending a public 4-year institution paid an average of $4,694 in tuition and fees. This compares to inflation-adjusted costs of $2,074 in 1983-84, and $3,188 in 1993-94 (Clinedinst, 2004). As the average tuition at state universities has more than doubled over the last 20 years, state and local appropriations have contributed a much smaller share of total revenue provided to public institutions. In 1980-81, approximately half the revenues of public institutions came from state and local appropriations. However, by 1999-2000, this proportion declined to nearly one-third (Couturier, 2006).

While providing financial support to public universities, states also provide aid directly to individual students who attend either a public or private in-state university. During 2003-04, state governments awarded approximately $7.3 billion in total state funded student financial aid to students attending public and private institutions within the state; the majority of these funds were in the form of direct student grants. However, the composition of need and non-need based state aid has shifted over time in a way that affects the college opportunities of low-income undergraduate students. In 1993-94, 90 percent of state aid was

in the form of need-based grant aid. Over the succeeding decade, the proportion of total aid accounted by need-based grant aid shrank to 74 percent. In fact, while total need-based grant aid grew by 103 percent, non-need grant aid increased by 532 percent (NASSGAP, 2003-04).

In addition to increasing tuition and costs and declining state and local support for public institutions, the composition of federal grant aid to students has also shifted toward merit-based aid and away from need-based assistance. Since the early 1980s, federal loans have been substituted for federal grant aid as the primary means of federally-financed government aid. By 2002-03, loans comprised nearly 70 percent of federal student financial aid (Clinedinst, 2004).

The Pell Grant Program

As direct need-based aid to students has increasingly been replaced by merit-based aid at both the federal and state level, the federal Pell Grant remains the one form of grant aid guaranteed to low-income students. With few exceptions, a Pell Grant (in some amount) is guaranteed to dependent students from families with household income less than $40,000. Indeed, 84 percent of dependent undergraduates with Pell Grants came from families with incomes less than $40,000 (Couturier, 2006). Since the Pell Grant is a federal aid program, it is provided to students across states, regardless of any individual state's higher education funding policies.

Pell Grants are directed to students with financial need who have not received their first bachelor's degree or who are enrolled in certain post baccalaureate programs that lead to teacher certification or licensure. The amounts depend on the student's expected family contribution (EFC),[2] the cost of attending the institution, whether the student attends full-time or part-time, and whether the student attends for a full academic year or less. An applicant may receive only one Pell Grant in an award year and may not receive Pell Grant funds from more than one school at a time. For the 2005-06 academic year, Pell Grant awards ranged from $400 to $4,050 (College Board, 2006).[3] During the 2003-04 academic year, more than

[2] The EFC is the number given to a college applicant, based upon the applicant's financial strength (as indicated by factors such as family income, net assets, and household size) which is combined with the applicant's educational cost and enrollment status (full time, three-quarter time, half time, or less than half time) to determine the applicant's grant level. In addition, a student must complete the FAFSA (Free Application for Federal Student Aid) in order to be eligible for a Pell Gant.

[3] The purchasing power of the Pell Grant has eroded over the last twenty years. In 1985-86, the Pell Grant covered approximately 60 percent of the tuition, fees, room and board at a public four-year university; twenty years later, that proportion fell to 33 percent. The 2008 Federal budget proposed by President G.W. Bush includes an increase in the maximum Pell Grant award to $4,600. This is a $550 increase over the existing

a quarter of all undergraduate students received Pell Grants, totalling $12.7 billion awarded to approximately 5.1 million students, with average grant amounts of $2,466 (College Board, 2004).

III. Research Question

The primary objective of this study is to uncover those factors that are related to the prevalence of students from low income families in the undergraduate student body of research-oriented universities. We measure this prevalence as the percent of the undergraduate student body in these schools receiving a Pell Grant; we refer to this variable as the "Pell Prevalence Ratio (PPR)."

Tebbs and Turner (2005) have identified a number of factors that might contribute to differences among universities in the PPR. These factors include: (i) differences among schools in market conditions (the cost of attending a public versus a private university); (ii) program offerings (e.g. adult education programs for non-degree seeking students); (iii) the demographic characteristics of Pell-eligible students among potential applicants (such as the relative number of academically qualified low-income students in a state); (iv) the pattern of term enrollment (the turnover rate, measured by the number of incoming mid-year transfer students); and (v) the prevalence of international (non-resident alien) students.

In addition to these factors, an institution's own capacity to provide grant aid to students, as well as the universe of enrollment options within a state might affect the PPR. We will study the extent to which these and other a priori factors are related to the prevalence of low-income students attending U. S. public and private research institutions.

The second objective of our analysis is to explore the extent to which an institution's actual PPR deviates from the value of PPR predicted from our model. For any given institution, this deviation is attributable to factors not included in the model. This residual indicates the extent to which an institution succeeds in enrolling low-income students, relative to what we would expect given the institution's characteristics and the environment in which it operates. Given the extensive set of control variables that we include in our estimation model, these residuals should prompt discussions at the various schools as to why individual performance exceeds or falls short of expected performance. Stated alternatively,

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award amount, which has remained at $4,050 since the 2003-04 academic year, and the largest increase in 30 years.

a large negative/positive residual value should prompt an institution to search for factors not included in the analysis that may explain its relative standing. The results should also prompt a search for institutional and state public policy initiatives that might improve success in attracting and retaining low-income students.

IV. Institutional Research Sample

Our analysis focuses exclusively on the variation in the prevalence of Pell Grant recipients among major research institutions in the United States. We utilize the IPEDS (Integrated Postsecondary Education Data System) database to identify each of the four-year public and private (not-for-profit) institutions in the United States that are classified as research universities.[4] Table 1 provides a descriptive summary of these universities.

Across these 148 schools, the pattern of low-income participation (PPR) varies substantially. Table 2 shows this variation for a set of large high quality institutions (as selected by the authors) for the 2003-04 school year.

In our analysis, we distinguish between four-year public and private universities, as differences in their mission may yield substantially different student selection processes and hence variation in Pell Grant participation. Most importantly, public and private universities recruit from different applicant pools, a function of fundamentally different institutional mandates. Since public universities are often required to enroll a minimum percentage of students from their home states, they face geographically constrained pools of applicants, while private universities can recruit students without these geographic considerations.[5]

Table 1: Descriptive Statistics for Institutional Research Sample

Descriptive Statistic	Full Sample	Publics Only	Privates Only
Sample Size (n)	148 [a]	101	47

[4] Source: IPEDS (www.nces.org). To identify the universe of research institutions among the four-year public and private universities, we used the Carnegie Classification, *Doctoral/Research Universities (Extensive).* The Carnegie Classification is used to distinguish higher education institutions in terms of their degree programs and institutional missions. Doctoral/Research Universities typically offer a wide range of baccalaureate programs, and are committed to graduate education through the doctorate. During any one year academic period, they award 50 or more doctoral degrees per year across at least 15 disciplines.

[5] In 2003-04, the University of Wisconsin-Madison enrolled 63.0 percent of first-time undergraduates from within Wisconsin; the University of Virginia enrolled 67.5 percent from Virginia; and the University of California-Berkeley enrolled 90.6 percent from California. (Source: IPEDS)

Number of States [b]	47		46		22
Enrollment [c]	17,589 (9,584)		21,892 (7,702)		8,436 (6,165)
Cost of Attendance [d]	$22,282 ($10,977)	$28,514 ($7,789)	$15,208 ($2,346)	$24,339 ($4,614)	$37,483 ($5,211)
Median SAT Score	1,194 (125)		1,134 (79)		1,324 (105)
# of Pell Recipients	3,595 (2,449)		4,804 (1,904)		1,333 (1,612)
PPR	20.0% (7.8%)		22.9% (7.1%)		14.8% (6.0%)

Calculations by authors using IPEDS data, standard deviation in parentheses.

[a] Of the n=101 public universities in our dataset, 89 had available Pell Grant data. Among them, the University of Toledo does not report SAT data, while Utah State University enrollment totals were inconsistently reported over time. As a result, these universities are dropped from the regression analysis, for a total number of 87 observations for the publics.

[b] The District of Columbia is included in the Full Sample and Privates-Only totals.

[c] Enrollment equals the 12-month unduplicated undergraduate-student count, less the number of international and non-degree seeking students for 2003-04.

[d] Cost of Attendance equals the sum of tuition and fees, room and board, books and supplies, and all other expenses (for a student living on-campus). For the Full Sample and the Publics Only, the left half of the cell includes in-state tuition and fees in the calculation, while the right half of the cell includes out-of-state tuition and fees in the calculation.

Moreover, as a result of state requirements to enroll a minimum percentage of in-state students at public universities, differences in the demographic characteristics among states might affect the percent of students at public universities receiving a Pell Grant. The demographic factors that might contribute to institutional differences in the PPR include the income distribution of the state (with particular emphasis on the percentage of low-income college eligible students in the state), the academic preparedness of a state's low-income college eligible population (as measured by norm-referenced standardized exams such as the NAEP, or college entrance exams such as the SAT or ACT), the racial composition of the low-income state population (with particular emphasis on the variation in the mix of minority populations[6]), and state-level expenditures on need-based and non-need-based grant aid for higher education.

[6] Tebbs and Turner (2005) identify differences in the relative academic performance of Asian and African-American students with incomes of less than $50,000, with Asian students performing better in both states. They also identify differences in the composition of the low-income minority populations in these two states, noting that 27.2 percent of low-income test takers in California were Asian, while 9.2 percent identified themselves as African-American; in Virginia, 28.1 percent of all low-income test takers were African-American, while 8.3 identified themselves as Asian.

Table 2: Variation in Pell Prevalence among Select Research Universities

STATE	UNIVERSITY	PERCENT WITH PELL GRANTS (2003-2004)
California	University of California - Los Angeles	35.9%
California	University of California - Berkeley	30.9%
Florida	Florida State University	24.2%
Florida	University of Florida	22.1%
Texas	University of Texas - Austin	20.3%
Michigan	Michigan State University	19.1%
Indiana	Purdue University	17.7%
Illinois	University of Illinois - Urbana-Champaign	17.6%
Minnesota	University of Minnesota - Twin Cities	16.6%
Iowa	University of Iowa	16.4%
Maryland	University of Maryland - College Park	16.0%
Indiana	Indiana University - Bloomington	14.9%
California	Stanford University	14.7%
Michigan	University of Michigan - Ann Arbor	13.9%
Wisconsin	University of Wisconsin - Madison	12.1%
Pennsylvania	University of Pennsylvania	10.6%
North Carolina	Duke University	10.1%
Illinois	Northwestern University	10.1%

Percent with Pell Grants calculated by the authors. Data used in calculation from IPEDS and Economic Diversity of Colleges (www.economicdiversity.org).
Private Universities are shaded

V. Research Strategy

To address our two underlying research questions, we estimate an OLS regression model designed to reveal the relationship between a set of independent exogenous variables and the number of Pell Grant recipients for both the public and private institutions in our research sample.[7] We divided these correlates into those that describe the university's characteristics ("Institutional-level variables") and those that describe the environment in which the university operates ("State-level variables").

The model that we estimate is:

[7] The number of Pell Grant recipients at each undergraduate institution was obtained using the Economic Diversity of Colleges online database; this database provided the numbers for the 2003-04 academic year, as supplied by the U.S. Department of Education (www.economicdiversity.org).

$$\rho = \beta_0 + \beta_1 I + \beta_2 S + \varepsilon$$

where: I: vector of Institutional-level variables

S: vector of State-level variables

ρ : the logged number of Pell Grant recipients at each institution during the 2003-04 academic year

Reflecting the fundamental differences between private and public research universities, we have organized the research sample into four-year public research institutions and four-year private (not-for-profit) research institutions.[8] We thus fit the same model over both the samples of public universities and private universities.[9] We control for an extensive set of variables at the institutional and state level. Given the specification of our model, the residuals from our regressions will be interpreted as values that should prompt institutional discussion and further investigation into the factors that may explain where an institution is positioned relative to expectations.

We have divided our explanatory variables into two categories: institutional and state-level variables.[10]

Institutional-Level Variables

Total Cost of Attendance: We calculated the total cost of attendance for each institution for the 2003-04 school year. The total cost variable is the sum of tuition and fees, the price of room and board for a student who lives on-campus, books and supplies, and other expenses related to on-campus residence. For private universities, tuition and fees are the same for

[8] In order to support the estimation of separate regression equations for public and private universities within our sample of national research universities, we ran an F-test of the significance of the difference in estimated coefficients between public and private universities. In particular, we estimated both an unrestricted (all public and private universities) and a restricted (only public universities) model. The parameter estimates to be tested were interacted with a dummy variable indicating the sector of the institution (1=Public; 0=Private). We then tested the joint restriction that the parameter estimates on all of the interacted variables were zero. The resulting F-statistic is: $F(11,110) = 2.10$, with an accompanying p-value = 0.0260. We therefore conclude that the underlying processes are distinctly and statistically different between public and private institutions in the recruitment and enrollment of low-income students. The estimation of separate regression models for the public universities and the private universities allows us to make valid cross-institutional comparisons of the PPR (as predicted by our model).

[9] Of the n=101 public universities in our dataset, 89 had available Pell Grant data. Two universities were excluded for data reasons (see above), leaving a sample of 87 public universities.

[10] The institutional and state-level variables discussed in this section are those included in the base model. However, a number of other variables were considered toward refining the base model specification. Appendix A summarizes these variables.

resident in-state students as well as for out-of-state students. However, for public universities, tuition and fees differ between resident and out-of-state students.

As the cost of attendance increases, the number of Pell Grant recipients can be expected to decrease. This is because higher tuition and fees would require greater resources from the students to attend college and hence crowd out low-income applicants.

Median SAT Score: We calculated the median SAT score for the Fall 2003 incoming freshmen class at each institution. For institutions where greater than 50 percent of students submitted the SAT on their application, we included the median SAT score. For institutions where greater than 50 percent of students submitted the ACT on their application, we converted the median ACT score into an SAT composite score.[11] For institutions that did not fall into either of these two categories, we calculated the median for the standardized exam with the greatest percent submitted (and converted to SAT where appropriate).

The median SAT score measures both the selectivity of the institution, as well as the academic quality of the applicants. We expect an inverse relationship between the median SAT score and the percent of students at a university with a Pell Grant; a higher median SAT score would tend to crowd out low-income applicants with less rigorous academic preparation (in primary and secondary school) and lower scores on standardized exams than their higher income counterparts.

Total Institutional Grant Aid: We calculated the total grant aid provided by an institution during the 2003-04 academic year. This variable accounts for the amount of university-specific funds awarded to students for scholarships and fellowships. The source of these funds includes (but are not limited to) university endowments, the institutional matching portion of federal, state or local grants, as well as businesses, foundations, private individuals, and in some case foreign governments.

Since institutional grant aid is not necessarily need-specific, its effect on the number of Pell Grant recipients is undetermined. In effect, a negative relationship could emerge if the effect of funds provided on purely merit-only basis dominates.

Total Undergraduate Enrollment: We included a variable for the total undergraduate enrollment at the institution. Total enrollment was calculated using the 12-month unduplicated undergraduate enrollment for the 2003-2004 academic year, from which we

[11] Conversion of ACT to SAT scores follows Dorans et al. (1997).

subtracted the number of non-degree seeking students (an average of the fall 2003 and fall 2004 totals) and international students.

We 'netted out' international and non-degree seeking students to arrive at a total 'Pell-eligible' undergraduate population. While not all undergraduate students are indeed eligible for a Pell Grant (ineligibility is a function of high family income as much as a result of a student not completing the FAFSA), the enrollment totals that we calculated allow us to most accurately control for the size of each institution.

Opportunity Cost of Attendance: We also considered the extent to which the 'opportunity cost' of attending a particular institution affects the prevalence of Pell Grant recipients at that school. The case may be that institutions residing in a state with many different enrollment options (among public and private institutions) bear a greater opportunity cost of attendance over another school within the state. Given these considerations, we constructed an *Institutional Opportunity Index*. This index considers both public and private institutions in each state, and equals the total number of resident freshmen (for the fall 2003 entering class) attending state two and four-year public and private institutions minus the number of resident freshmen attending a particular institution in question.

We believe that the more enrollment options available to students (i.e. the greater the Institutional Opportunity Index) outside of a particular institution, the lower the number of Pell Grant recipients at that particular institution (and the lower the expected PPR).

State-Level Variables

In order to control for the differences between states, we calculated a series of state-based demographic control variables.

Percent of Minorities: We calculated the percent of minorities in each state; that is, the percent of the state population represented by Blacks, Hispanics, Asians and Native Americans. Tebbs and Turner (2005) noted that the percent of an undergraduate population receiving a Pell Grant is influenced by the proportion of these groups in the state, particularly as each of these groups are often disproportionately over-represented among the state's low-income population.

Low-Income Recruitment Pool: In order to control for the economic environment from which universities recruit within their respective states, we calculated the *Low-Income K-12 Student Population* as the percentage of students ages 6-18 in each state that were living at or below

200 percent of the federal poverty level.[12] This variable provides our analysis with a proxy for the percentage of students within a state that would both be eligible for the federal free and reduced lunch plans in elementary and secondary schools, as well as for the population who are eligible to receive a federal Pell Grant at the time of application to a postsecondary institution.

State Grant Aid: We calculated the state-level capacity to provide grant aid to undergraduate students as the sum of need-based grant aid and nonneed-based grant aid awarded by the state. Need-based grant aid is the total grant aid available to students who meet some standard of need, as determined by the state of residence (such measures include the expected family contribution, the remaining costs of college attendance, or some maximum income level required to be eligible for an award). Nonneed-based grant aid is the total grant aid available to students who are not required to demonstrate financial need to be eligible for an award; in most cases, this aid is based largely on measures of academic merit (NASSGAP, 2004).

We included the *Total Grant Aid* variable in our analysis, rather than both a need-based and a nonneed-based grant aid variable because of the ambiguity that exists around the eligibility criteria for receiving need-based grant aid. Some state grants are based only on need and some only on merit; however, many state grants are based on a combination of these need and merit criteria. Furthermore, since some states (e.g. California, Pennsylvania, Texas) have identified their grant provisions as need-based only, it is unclear whether this grant aid is based solely on the financial need of undergraduate students in their state, or some combination of need and merit criteria (NASSGAP, 2004).

VI. Empirical Results

Estimation Results for Base Case Model

To investigate the correlates of the Pell Grant recipient variable, we estimated a base case regression model with the same set of independent variables included in the estimates for both public and private institutions. Table 3 summarizes the coefficient estimates for this model. We interpret our results separately for public and private universities.

[12] The poverty threshold for a family of four with two children in 2003 was $18,660 (Source: U.S. Census).

Public Sector Institutions

The Median SAT variable was a significant and substantive predictor of the number of Pell Grant recipients at public institutions. We find that a 1 percent increase in the Median SAT score of an institution's incoming freshman class corresponds to a 2.28 percent decrease in the number of Pell Grant recipients. The negative coefficient on this variable is consistent with our hypothesis of a negative relationship between school selectivity (median SAT score for incoming freshmen) and the number of Pell eligible students.

The size of the undergraduate population at public institutions was strongly correlated with the prevalence of Pell Grant recipients. Our analysis found that a 1 percent increase in the total undergraduate enrollment (adjusted for non-degree seeking and international students) yields a 0.63 percent increase in the number of Pell Grant recipients. The statistically significant relationship between enrollment and Pell Grant prevalence in a positive direction conforms to an a priori assessment of this variable; namely, as the size of a public institution increases, the absolute number of Pell Grant recipients should also increase. While this variable is statistically significant, the inelastic relationship (elasticity < 1) suggests that enrollment size is not quantitatively important in understanding the prevalence of lower income students among institutions.

Table 3: Base Case Model

Dependent Variable: Number of Pell Grant recipients (logged) (2003-04)

	Independent Variables	Public	Private
INSTITUTIONAL-LEVEL	Total Cost of Attendance (out-of-state) (logged)	-.0822 (.1882)	-.6161 * (.3320)
	Median SAT (logged)	-2.276 *** (.5193)	-1.651 ** (.6669)
	Institutional Grant Aid (logged)	.0178 (.0414)	-.1309 (.0954)
	Enrollment (logged)	.6309 *** (.0974)	1.029 *** (.0886)
	Institutional Opportunity Index (logged)	.1759 *** (.0564)	.0339 (.1162)
STATE-LEVEL	Low-Income K-12 Student Population	1.482 ** (.5939)	.4416 (1.235)

	Minority Population	% Black	-.9066 ** (.3789)	-.1372 (.8025)
		% Hispanic	-.4594 (.4023)	-.3601 (.9163)
		% Native American	1.674 (2.296)	11.753 (27.982)
		% Asian	.7069 (.5824)	4.396 (2.850)
	Total Grant Aid (logged)		.0038 (.0291)	.0609 (.1019)
	Constant		16.277 *** (3.778)	16.653 *** (.1019)
	Observations		87	47
	R-Squared		.7528	.9097

Coefficients are statistically significant at the *10 percent, **5 percent, or ***1 percent level. Standard errors are in parentheses.

The coefficient on the Institutional Opportunity Index indicates that a 1 percent increase in the total enrollment seats outside of a public institution (and within the state) leads to a 0.17 percent increase in the number of Pell Grant recipients at the institution. This result contrasts with our initial belief that the more enrollment options outside of an institution would lead to fewer Pell recipients. However, two issues are to be considered in the interpretation of this finding. First, the effect size is rather small; so while the coefficient is statistically significant, the size is not very substantive. Second, the case could be that in a given state, the four-year public institutions (i.e. the state flagship and research universities) represent engines of opportunity relative to the other private colleges and universities in the state. As a result, this sample of institutions bear a smaller opportunity cost of attendance relative to the other two and four year public and private schools in the state.

The percentage of students ages 6-18 in each state, the *Low-Income K-12 Student Population* variable, was a significant predictor of the prevalence of Pell Grant recipients. A 1 percent increase in this variable led to a 1.48 percent increase in the number of Pell Grant recipients, indicating that the public institutions are responsive to state demographics among the college eligible (and Pell eligible) population.

The only minority group on which we find a significant coefficient is for the black state population. The estimated parameter on the percentage of blacks in the state indicates a negative relationship between the percent of the state's population that is black, and the number of Pell recipients at the public research institutions.

The three remaining variables included in the model do not show a statistically significant relationship with our dependent variable. The cost of attendance for public institutions does not seem to be a fundamental factor in determining low-income participation at public institutions. On the other hand, we believe that the insignificant effect of the institutional and state total grant aid variables can be explained by the ambiguity in the definition of aid, at both levels.

Private Sector Institutions

Unlike the model results for the public institutions, the cost of attendance variable is a significant predictor of Pell Grant prevalence. A 1 percent increase in the cost of attendance yields a 0.62 percent decrease in the number of Pell Grant recipients. This suggests that increases in the total cost of attendance provide a disincentive for low-income students to apply to 4-year private institutions, acting as a form of 'sticker-shock' that compels low-income students to self-select out of the application process. Furthermore, in the absence of supplemental funding for Pell eligible students, increases in tuition and other related charges crowd low-income students (who formerly had been able to meet the total cost of attendance) out of the private higher education market.

The coefficient on the Median SAT variable under the private-only specification, similar to the public-only specification, is statistically significant in a negative direction. However, the effect size is smaller than it is under the public-only specification. A 1 percent increase in the Median SAT score variable leads to a 1.65 percent decrease in the number of Pell Grant recipients. The enrollment effects on Pell Grant prevalence are also significant for the private institutions. Our analysis finds that a 1 percent increase in total undergraduate enrollment leads to a 1.03 percent increase in the number of Pell Grant recipients.

It is interesting to note that none of the state level variables are statistically significant in the private-only specification. This is consistent with the above-mentioned difference between public and private institutions in the geographic market of their applicants.

Sensitivity Tests of Base Case Results

We have estimated a number of alternative models for both the public and private institutions. In these alternative specifications, we included additional institutional and state-level variables not controlled for in the base case model. These variables are described in appendix A.[13] We explored the relationship between indexed measures of institutional selectivity and the prevalence of Pell Grant recipients. The selectivity measure we analyzed was the Barron's Profiles of American Colleges (2001) rankings of major universities.[14] However, we found that these Selectivity variables were highly correlated with the Median SAT variable.

We also identified and explored the effect of additional demographic variables on Pell Grant prevalence and their correlation with other variables under consideration in our analysis. We calculated a variable which captured the Undergraduate-Age Poverty Population; that is, the percentage of young adults age 18 to 24 per state in 2003 living at or below 100% of federal poverty threshold and the unemployment rate for each state for 2003. We found these variables to be highly correlated with the K-12 Low-Income variable.

Of all the variables considered, our preferred alternative specification included the following variables:

- a state's per-capita income (in 2003 inflation-adjusted dollars),
- a composite index for the 2003 8th grade NAEP mathematics and reading scores for each state, and
- the total number of 18-24 year olds in each state in 2003.

For both the public-only and private-only estimations, the alternative model provided very little increase in total explanatory power. The additional control variables affected the size (and in some cases the direction) of only a few parameter estimates. In the context of the public-only estimation, the coefficient on the Institutional Opportunity Index becomes

[13] Detailed tables with results from these estimations are available on request from the authors.

[14] Barron's rankings designate the selectivity of a university through a categorical rating system; the categories include: Not Competitive; Low Competitive; Competitive; Competitive+, Very Competitive, Very Competitive+; Highly Competitive; Highly Competitive+; and Most Competitive. We converted the Barron's selectivity measure in two ways; first, we collapsed the categories from nine to three, creating the following categorical variables: (a) High Selectivity; (b) Medium Selectivity; and (c) Low Selectivity. We also converted the Barron's selectivity rankings into an indicator variable, which we called High Selectivity, where the value of one (1) was given to Barron's rankings of Highly Competitive, Highly Competitive+ and Most Competitive. A zero (0) value was given to the remaining Barron's rankings.

insignificant, while the state grant aid variable becomes negative (but remains a non-significant predictor). The private-only estimation was not affected by the inclusion of the additional state-level variables.

Residual Value Analysis

To evaluate the patterns by which an institution's actual PPR deviates from the value of the Pell ratios predicted by our model, we conducted a residual value analysis. From the coefficient results of the base case regression model, we predicted the total number of Pell Grant recipients at each institution.[15] We then calculated the predicted PPR value by dividing the estimated number of Pell Grant recipients at each institution by the institution's enrollment.[16] Finally, we subtracted the predicted from the institution's actual PPR, to arrive at a residual value. A negative residual value indicates that the university is performing below expectations relative to our model, while a positive residual value indicates above-expected performance with respect to enrolling Pell Grant recipients.

Appendix B summarizes each institution's actual and predicted PPR, their residual value, as well as within-sector ranking and overall ranking. The within-sector ranking indicates an institution's relative position among either the public or private universities, while the overall ranking positions an institution's residual value relative to all public and private universities in the sample. The rankings are in both percentage and numerical terms. For example, an institution whose within-sector percentile ranking is 5 percent indicates that that institution is performing better than 5 percent of its sector peers (i.e. if the institution is

[15] We used the parameter estimates from the public-only model to predict the Pell recipients for the public universities, and the parameter estimates from the private-only model to predict the Pell recipients for the private universities.

[16] Note that the percentage of Pell Grant recipients that we use differs from that which is often reported by universities and publications such as *U.S. News and World Report*. That reported value is calculated by dividing the number of Pell recipients in an academic year (numerator) by the undergraduate enrollment in the fall term of the academic year (denominator). However, a number of methodological inaccuracies exist in this formulation of the PPR. The numerator measures the number of students receiving a Pell Grant for the entire academic year, which will capture students who are enrolled in the fall term, as well as students who are mid-year transfers to a university. However, the denominator measures enrollment at a single point in time, and does not accurately consider a university's enrollment turnover which is affected by mid-year transfer students. As a consequence, institutions with high turnover (mid-year transfers) will record (inaccurately) higher PPR measures. Tebbs and Turner (2005) note that institutions that do not focus on full-time four year programs will have highly inflated PPR measures under this definition. Moreover, in this definition, the denominator includes two categories of students that are ineligible to receive a Pell Grant; namely, non-degree seeking students and non-resident alien (international) students. Non-degree seeking students generally indicate the presence of adult education programs, so that an institution with an extensive adult-education program is penalized in terms of the perception of their commitment to low-income students. International students are similarly ineligible for Pell Grants, since status as a U.S. Citizen, U.S. National or Permanent Resident is necessary to qualify for a Pell Grant.

public, then it is performing better than 5 percent of the public universities in this sample). In numerical terms, an institution that is ranked 15th out of 47 private universities indicates that it is performing better than 32 of the private institutions in this sample.

Note that very interesting intra-state results among the public schools emerge from a detailed analysis of the table. We believe that this reveals a form of 'Institutional Stratification" among large public universities within the same state. For example, in California, UC-Berkeley, UCLA and UC-San Diego are each in the top 15 percent of public schools based on residual performance, while UC-Santa Barbara and UC-Santa Cruz are in the bottom 10 percent. These differences in enrollment patterns call for further investigation of admission policies. When looking at the results in Georgia, we notice that the University of Georgia and Georgia Tech are both in the bottom 25 percent, while Georgia State is in the top quartile. We speculate that the historically black character of Georgia State may explain this result. Other states where we observe significant intra-state variations are Iowa, Kansas, Kentucky, New York, South Carolina, Tennessee and Virginia. We believe that the significant intra-state stratification patterns that our analysis has revealed are a potential stimulus for future research.

VII. Conclusions

Our analysis has yielded insight into those factors that appear to influence the variation in Pell grant recipients among our sample of major public and private research institutions. We are able to explain a substantial proportion of the variation among the public universities and the private universities in the prevalence of low income students. Furthermore, we have identified those factors that are statistically significantly related to the prevalence of Pell Grant recipients.

A key finding is the very large and negative effect of the median SAT score of incoming freshmen students on Pell recipients for both public and private institutions. This variable is an important measure of institutional selectivity, and reflects the drive for high institutional rank exercised in varying degrees by all of the institutions. This conclusion raises clear concerns regarding the drive for high institutional rank on the economic diversity of the undergraduate student body. However, more work is necessary to fully understand the

nature of recruitment practices that might crowd out low-income students in the process of seeking high institutional rank.

Using the results of our regression analysis, we have indicated each university's performance in terms of the prevalence of students from low income families—as proxied by PPR—relative to the prevalence one would expect given the institution's characteristics and the characteristics of the student population from which it is likely to draw. The detailed assessment of each university's relative success in enrolling Pell Grant recipients should serve as the basis for additional study into the reasons why some institutions exceed expectations while others fall short of their predicted level of low-income students. We believe that this analysis can inform discussion of low-income access to higher education among policymakers, university officials, researchers and all other interested parties.

Our analysis should therefore provide the catalyst for institutions to explore a range of alternative policies—such as those used by institutions whose performance exceeds expectations—in attaining the goal of an economically diverse student body. What practices do successful institutions pursue in attracting qualified students from low income families? Can these practices inform efforts by the underperforming institutions to increase economic diversity?

Appendix A: Summary of Explanatory Variables

The tables below detail the Institutional and State-level variables considered in the analysis for each of the 148 institutions in the research sample.

Institutional-Level Variables

Variable	Description	Data Source
Pell Grant Recipients	The number of Pell Grant recipients at each undergraduate institution in 2003-04.	Economic Diversity of Colleges[17]
Sector	The sector identifies a university as a public or private (not-for-profit) 4-year degree granting institution.	IPEDS
Enrollment	The 12-month unduplicated undergraduate enrollment for the 2003-2004 academic year (less non-degree seeking students (average of fall '03 and fall '04) and international students)	IPEDS
Cost of Attendance	The 2003-2004 academic year cost of attendance includes: tuition & fees, room & board, books & supplies, other expenses (on campus).	IPEDS
Median SAT Score	The Median (50%) SAT score for the 2003 entering freshman class at each university.	IPEDS
Selectivity Rankings	The Barron's Profiles of American Colleges (2001) rankings of major universities	Barron's Profiles of American Colleges (2001)
Institutional Opportunity Index	An index of the total resident undergraduate enrollment opportunities outside of the institution in question.	IPEDS
Institutional Grant Aid	The total amount of institutional grant aid provided for scholarships and fellowships.	IPEDS

State-Level Variables

[17] This database provides the number of federal Pell grants awarded at each college for the 2003-04 academic year, supplied by the U.S. Department of Education. (www.economicdiversity.org)

Variable	Description	Data Source
Low-Income K-12 Student Population	The percentage of 6-18 population per state in 2003 living at or below 200% of federal poverty threshold (The poverty threshold for a family of four with two children was $19,157 in 2004 and $18,660 in 2003)	National Center for Children in Poverty[18]
Undergraduate-Age Poverty Population	The percentage of young adults age 18 to 24 per state in 2003 living at or below 100% of federal poverty threshold (The poverty threshold for a family of four with two children was $19,157 in 2004 and $18,660 in 2003)	Casey Foundation Kids Count State-Level Data.[19]
Race/Ethnicity variables	The percentage of Blacks, Asians, Hispanics and Native Americans per state population in 2003.	U.S. Census
Unemployment Rate	The percentage of unemployed population per state in 2003.	U.S. Census
Per Capita Income	State per capita income for 2003.	U.S. Census
Total Grant Aid	The total amount of need and non-need based aid provided by a state to individual students attending public and private in-state universities.	NASSGAP[20]
Low-Income Student College Preparedness (NAEP)	8th grade NAEP scores per state – composite of math and reading scores for students eligible for free and reduced lunch program (2003)	IPEDS
18-24 year old population	The total number of 18-24 year olds in the state (2003)	U.S. Census

[18] A leading public policy center dedicated to promoting the economic security, health, and well-being of America's low-income families and children, located at the Mailman School of Public Health at Columbia University.
[19] *Kids Count* is a project of the Annie E. Casey Foundation in the effort to track the status of children in the U.S.
[20] National Association of State Student Grant and Aid Programs. NASSGAP completes an annual survey documenting state-funded expenditures for postsecondary student financial aid.

Appendix B: Residual Analysis Results

STATE	UNIVERSITY	PPR (ACTUAL)	PPR (PREDICTED)	RESIDUAL VALUE	WITHIN-SECTOR RESIDUAL RANKING (higher %ile rank => better Pell performance)	OVERALL RESIDUAL RANKING (higher %ile rank => better Pell performance)
Alabama	Auburn University – Main Campus	15.0%	19.4%	-4.4%	74/87 (15%)	118/134 (12%)
Alabama	University of Alabama	23.0%	21.6%	1.4%	35/87 (60%)	52/134 (61%)
Alabama	University of Alabama at Birmingham	28.9%	28.9%	0.0%	48/87 (45%)	74/134 (45%)
Arizona	Arizona State University - Tempe[21]	n/a	19.1%	n/a	n/a	n/a
Arizona	University of Arizona	18.0%	18.6%	-0.6%	52/87 (40%)	80/134 (40%)
Arkansas	University of Arkansas – Main Campus	24.8%	24.6%	0.2%	46/87 (47%)	71/134 (47%)
California	California Institute of Technology	19.0%	18.6%	0.4%	24/47 (49%)	69/134 (49%)
California	Stanford University	14.7%	15.9%	-1.2%	31/47 (34%)	84/134 (37%)
California	University of California – Berkeley	30.9%	20.6%	10.3%	4/87 (95%)	4/134 (97%)
California	University of California – Davis	27.0%	25.8%	1.2%	38/87 (56%)	56/134 (58%)
California	University of California – Irvine	29.2%	27.2%	2.0%	28/87 (68%)	44/134 (67%)
California	University of California – Los Angeles	35.9%	21.2%	14.7%	1/87 (99%)	1/134 (99%)
California	University of California – Riverside	41.1%	38.3%	2.8%	26/87 (70%)	39/134 (71%)
California	University of California – San Diego	29.3%	24.1%	5.2%	13/87 (85%)	16/134 (88%)
California	University of California – Santa Barbara	24.1%	29.6%	-5.5%	80/87 (8%)	126/134 (6%)
California	University of California – Santa Cruz	25.2%	34.0%	-8.8%	86/87 (1%)	133/134 (1%)
California	University of Southern California	21.2%	18.0%	3.2%	9/47 (81%)	31/134 (77%)

[21] The number of Pell Grant recipients not reported at the institutional level.

Colorado	Colorado State University	16.8%	19.5%	-2.7%	63/87 (28%)	102/134 (24%)
Colorado	University of Colorado – Boulder	13.1%	15.6%	-2.5%	60/87 (31%)	98/134 (27%)
Colorado	University of Denver	14.1%	16.5%	-2.4%	38/47 (19%)	97/134 (28%)
Connecticut	University of Connecticut[22]	n/a	15.5%	n/a	n/a	n/a
Connecticut	Yale University	11.1%	7.8%	3.3%	8/47 (83%)	30/134 (78%)
Delaware	University of Delaware	9.7%	11.5%	-1.8%	56/87 (36%)	90/134 (33%)
Florida	Florida International University	29.1%	21.2%	7.9%	8/87 (91%)	8/134 (94%)
Florida	Florida State University	24.2%	20.1%	4.1%	19/87 (78%)	24/134 (82%)
Florida	University of Florida	22.1%	16.0%	6.1%	9/87 (90%)	14/134 (92%)
Florida	University of Miami	21.7%	14.4%	7.3%	1/47 (99%)	9/134 (93%)
Florida	University of South Florida	27.2%	21.6%	5.6%	11/87 (87%)	14/134 (90%)
Georgia	Emory University	12.8%	12.2%	0.6%	22/47 (53%)	64/134 (52%)
Georgia	Georgia Institute of Technology	13.8%	17.3%	-3.5%	68/87 (22%)	112/134 (16%)
Georgia	Georgia State University	26.5%	22.5%	4.0%	21/87 (76%)	26/134 (81%)
Georgia	University of Georgia	12.7%	16.4%	-3.7%	70/87 (20%)	114/134 (15%)
Hawaii	University of Hawaii – Manoa	19.5%	23.4%	-3.9%	71/87 (18%)	115/134 (14%)
Idaho	University of Idaho	35.7%	25.7%	10.0%	5/87 (94%)	5/134 (96%)
Illinois	Loyola University Chicago	26.4%	21.3%	5.1%	4/47 (91%)	19/134 (86%)
Illinois	Northern Illinois University	25.8%	28.3%	-2.5%	62/87 (29%)	101/134 (25%)
Illinois	Northwestern University	10.1%	11.6%	-1.5%	33/47 (30%)	88/134 (34%)
Illinois	Southern Illinois University – Carbondale	31.9%	29.7%	2.2%	27/87 (69%)	43/134 (68%)
Illinois	University of Chicago	14.1%	11.1%	3.0%	11/47 (77%)	35/134 (74%)
Illinois	University of Illinois at Chicago	30.5%	26.6%	3.9%	22/87 (75%)	27/134 (80%)
Illinois	University of Illinois – Urbana-Champaign	17.6%	16.0%	1.6%	31/87 (64%)	47/134 (65%)
Indiana	Indiana University – Bloomington	14.9%	19.4%	-4.5%	76/87 (13%)	120/134 (10%)
Indiana	Purdue University – Main Campus	17.7%	18.1%	-0.4%	50/87 (43%)	77/134 (43%)

[22] The number of Pell Grant recipients not reported at the institutional level.

Indiana	University of Notre Dame	9.3%	11.3%	-2.0%	35/47 (26%)	92/134 (31%)
Iowa	Iowa State University	24.3%	19.1%	5.2%	14/87 (84%)	17/134 (87%)
Iowa	University of Iowa	16.4%	19.4%	-3.0%	65/87 (25%)	108/134 (19%)
Kansas	Kansas State University	25.3%	20.9%	4.4%	17/87 (80%)	22/134 (84%)
Kansas	University of Kansas	14.6%	19.5%	-4.9%	78/87 (10%)	123/134 (8%)
Kentucky	University of Kentucky	35.6%	23.9%	11.7%	2/87 (98%)	2/134 (99%)
Kentucky	University of Louisville	22.4%	29.0%	-6.6%	83/87 (5%)	129/134 (4%)
Louisiana	Louisiana State University	19.1%	18.1%	1.0%	40/87 (54%)	59/134 (56%)
Louisiana	Tulane University	15.7%	12.2%	3.5%	6/47 (87%)	28/134 (79%)
Maine	University of Maine	27.4%	24.5%	2.9%	25/87 (71%)	36/134 (73%)
Maryland	Johns Hopkins University	10.6%	10.4%	0.2%	26/47 (45%)	72/134 (46%)
Maryland	University of Maryland – Baltimore County	21.5%	17.2%	4.3%	18/87 (79%)	23/134 (83%)
Maryland	University of Maryland – College Park	16.0%	10.6%	5.4%	12/87 (86%)	15/134 (89%)
Massachusetts	Boston College	10.0%	12.9%	-2.9%	42/47 (11%)	105/134 (22%)
Massachusetts	Boston University	12.2%	11.4%	0.8%	20/47 (57%)	62/134 (54%)
Massachusetts	Brandeis University	13.6%	12.6%	1.0%	19/47 (60%)	58/134 (57%)
Massachusetts	Harvard University	6.9%	9.1%	-2.2%	37/47 (21%)	96/134 (28%)
Massachusetts	Massachusetts Institute of Technology	14.9%	8.9%	6.0%	3/47 (94%)	13/134 (90%)
Massachusetts	Northeastern University	12.1%	14.3%	-2.2%	36/47 (23%)	95/134 (29%)
Massachusetts	Tufts University	11.3%	12.5%	-1.2%	32/47 (32%)	86/134 (36%)
Massachusetts	University of Massachusetts – Amherst	20.4%	19.6%	0.8%	42/87 (52%)	61/134 (54%)
Michigan	Michigan State University	19.1%	18.7%	0.4%	44/87 (49%)	67/134 (50%)
Michigan	University of Michigan – Ann Arbor	13.9%	16.0%	-2.1%	59/87 (32%)	94/134 (30%)
Michigan	Wayne State University	28.8%	33.3%	-4.5%	77/87 (11%)	121/134 (10%)
Michigan	Western Michigan University	19.9%	25.1%	-5.2%	79/87 (9%)	125/134 (7%)

Minnesota	University of Minnesota – Twin Cities	16.6%	16.1%	0.5%	43/87 (51%)	66/134 (51%)
Mississippi	Mississippi State University	26.5%	23.3%	3.2%	23/87 (74%)	32/134 (76%)
Mississippi	University of Mississippi – Main Campus[23]	n/a	27.1%	n/a	n/a	n/a
Mississippi	University of Southern Mississippi	38.0%	29.8%	8.2%	6/87 (93%)	6/134 (96%)
Missouri	Saint Louis University	15.9%	13.1%	2.8%	12/47 (74%)	37/134 (72%)
Missouri	University of Missouri – Columbia	16.0%	18.0%	-2.0%	58/87 (33%)	93/134 (31%)
Missouri	Washington University in St. Louis	4.9%	9.5%	-4.6%	45/47 (4%)	122/134 (9%)
Nebraska	University of Nebraska – Lincoln	20.3%	19.0%	1.3%	36/87 (59%)	53/134 (60%)
Nevada	University of Nevada – Reno	11.0%	20.6%	-9.6%	87/87 (0%)	134/134 (0%)
New Hampshire	University of New Hampshire	18.0%	16.4%	1.6%	32/87 (63%)	48/134 (64%)
New Jersey	Princeton University	8.1%	10.9%	-2.8%	40/47 (15%)	103/134 (23%)
New Jersey	Rutgers University – New Brunswick[24]	n/a	n/a	n/a	n/a	n/a
New Mexico	New Mexico State University – Main Campus[25]	n/a	33.9%	n/a	n/a	n/a
New Mexico	University of New Mexico – Main Campus[26]	n/a	27.0%	n/a	n/a	n/a
New York	Columbia University	16.1%	13.6%	2.5%	15/47 (68%)	41/134 (69%)
New York	Cornell University	17.9%	15.3%	2.6%	14/47 (70%)	40/134 (70%)
New York	Fordham University	25.7%	21.1%	4.6%	5/47 (89%)	21/134 (84%)
New York	New York University	17.0%	15.7%	1.3%	17/47 (64%)	51/134 (62%)
New York	Rensselaer Polytechnic Institute	20.5%	17.6%	2.9%	13/47 (72%)	38/134 (72%)
New York	SUNY at Albany	29.6%	32.6%	-3.0%	66/87 (24%)	109/134 (19%)
New York	SUNY at Binghamton	29.3%	28.9%	0.4%	45/87 (48%)	68/134 (49%)
New York	SUNY at Buffalo	36.9%	28.9%	8.0%	7/87 (92%)	7/134 (95%)

[23] The number of Pell Grant recipients not reported at the institutional level.
[24] Institutional Aid data was unavailable for Rutgers University; the number of Pell Grant recipients not reported at the institutional level.
[25] The number of Pell Grant recipients not reported at the institutional level.
[26] The number of Pell Grant recipients not reported at the institutional level.

New York	SUNY at Stony Brook	37.7%	26.2%	11.5%	3/87 (97%)	3/134 (98%)
New York	Syracuse University	13.9%	18.9%	-5.0%	46/47 (2%)	124/134 (7%)
New York	University of Rochester	17.8%	17.1%	0.7%	21/47 (55%)	63/134 (53%)
New York	Yeshiva University	13.5%	22.2%	-8.7%	47/47 (0%)	132/134 (1%)
North Carolina	Duke University	10.1%	11.0%	-0.9%	29/47 (38%)	82/134 (39%)
North Carolina	North Carolina State University – Raleigh	16.1%	19.1%	-3.0%	64/87 (26%)	107/134 (20%)
North Carolina	University of North Caroline – Chapel Hill	13.8%	18.2%	-4.4%	75/87 (14%)	119/134 (11%)
Ohio	Case Western Reserve University	16.6%	13.4%	3.2%	10/47 (79%)	33/134 (75%)
Ohio	Kent State University – Main Campus[27]	n/a	28.1%	n/a	n/a	n/a
Ohio	Ohio State University – Main Campus[28]	n/a	16.6%	n/a	n/a	n/a
Ohio	Ohio University – Main Campus[29]	n/a	25.7%	n/a	n/a	n/a
Ohio	University of Cincinnati – Main Campus[30]	n/a	26.1%	n/a	n/a	n/a
Ohio	University of Toledo[31]	32.5%	n/a	n/a	n/a	n/a
Oklahoma	Oklahoma State University	27.4%	27.7%	-0.3%	49/87 (44%)	76/134 (43%)
Oklahoma	University of Oklahoma – Norman	23.2%	23.1%	0.1%	47/87 (46%)	73/134 (46%)
Oregon	Oregon State University	27.0%	23.8%	3.2%	24/87 (72%)	34/134 (75%)
Oregon	University of Oregon	24.5%	22.8%	1.7%	30/87 (66%)	46/134 (66%)
Pennsylvania	Carnegie Mellon University	12.9%	12.3%	0.6%	23/47 (51%)	65/134 (51%)
Pennsylvania	Lehigh University	12.1%	14.9%	-2.8%	41/47 (13%)	104/134 (22%)
Pennsylvania	Pennsylvania State University – Main Campus[32]	n/a	18.0%	n/a	n/a	n/a
Pennsylvania	Temple University	25.9%	24.5%	1.4%	34/87 (61%)	50/134 (63%)

[27] The number of Pell Grant recipients not reported at the institutional level.
[28] The number of Pell Grant recipients not reported at the institutional level.
[29] The number of Pell Grant recipients not reported at the institutional level.
[30] The number of Pell Grant recipients not reported at the institutional level.
[31] The University of Toledo does not collect SAT score data, so we were unable to estimate a predicted PPR measure.
[32] The number of Pell Grant recipients not reported at the institutional level.

Pennsylvania	University of Pennsylvania	10.6%	11.0%	-0.4%	28/47 (40%)	79/134 (41%)
Pennsylvania	University of Pittsburgh – Main Campus	16.7%	21.0%	-4.3%	73/87 (16%)	117/134 (13%)
Rhode Island	Brown University	11.9%	9.6%	2.3%	16/47 (66%)	42/134 (69%)
Rhode Island	University of Rhode Island	18.3%	18.7%	-0.4%	51/87 (41%)	78/134 (42%)
South Carolina	Clemson University	14.1%	17.8%	-3.7%	69/87 (21%)	113/134 (16%)
South Carolina	University of South Carolina – Columbia	23.7%	18.6%	5.1%	15/87 (83%)	18/134 (87%)
Tennessee	University of Memphis	33.0%	28.9%	4.1%	20/87 (77%)	25/134 (81%)
Tennessee	University of Tennessee	20.5%	21.2%	-0.7%	53/87 (39%)	81/134 (40%)
Tennessee	Vanderbilt University	11.7%	10.4%	1.3%	18/47 (62%)	55/134 (59%)
Texas	Rice University	11.7%	14.8%	-3.1%	44/47 (6%)	110/134 (18%)
Texas	Southern Methodist University	15.8%	16.8%	-1.0%	30/47 (36%)	83/134 (38%)
Texas	Texas A&M University	17.6%	21.0%	-3.4%	67/87 (23%)	111/134 (17%)
Texas	Texas Tech University	19.3%	27.4%	-8.1%	85/87 (2%)	131/134 (2%)
Texas	University of Houston – University Park	29.0%	30.2%	-1.2%	54/87 (38%)	85/134 (37%)
Texas	University of North Texas	22.4%	28.6%	-6.2%	82/87 (6%)	128/134 (4%)
Texas	University of Texas – Arlington	24.6%	32.4%	-7.8%	84/87 (3%)	130/134 (3%)
Texas	University of Texas – Austin	20.3%	19.3%	1.0%	41/87 (53%)	60/134 (55%)
Utah	Brigham Young University	29.9%	26.4%	3.5%	7/47 (85%)	29/134 (78%)
Utah	University of Utah	22.9%	18.1%	4.8%	16/87 (82%)	20/134 (85%)
Utah	Utah State University[33]	n/a	n/a	n/a	n/a	n/a
Vermont	University of Vermont	16.7%	15.0%	1.7%	29/87 (67%)	45/134 (66%)
Virginia	Old Dominion University	25.3%	23.9%	1.4%	33/87 (62%)	49/134 (63%)
Virginia	University of Virginia	8.3%	14.3%	-6.0%	81/87 (7%)	127/134 (5%)
Virginia	Virginia Commonwealth University	21.9%	20.6%	1.3%	37/87 (57%)	54/134 (60%)
Virginia	Virginia Polytechnic Institute & State University	13.5%	15.5%	-2.0%	57/87 (34%)	91/134 (32%)

[33] Utah State was excluded from analysis due to changes in how undergraduate enrollment was reported.

Washington	University of Washington – Seattle[34]	n/a	16.3%	n/a	n/a	n/a
Washington	Washington State University	26.1%	25.0%	1.1%	39/87 (55%)	57/134 (57%)
Washington D.C.	American University	13.3%	13.0%	0.3%	25/47 (47%)	70/134 (48%)
Washington D.C.	Catholic University of America	12.3%	15.1%	-2.8%	43/47 (9%)	106/134 (21%)
Washington D.C.	George Washington University	8.8%	10.3%	-1.5%	34/47 (28%)	89/134 (34%)
Washington D.C.	Georgetown University	9.8%	9.9%	-0.1%	27/47 (43%)	75/134 (44%)
Washington D.C.	Howard University	37.3%	30.7%	6.6%	2/47 (96%)	10/134 (93%)
West Virginia	West Virginia University	24.5%	25.8%	-1.3%	55/87 (37%)	87/134 (35%)
Wisconsin	Marquette University	15.6%	18.1%	-2.5%	39/47 (17%)	99/134 (26%)
Wisconsin	University of Wisconsin – Madison	12.1%	14.7%	-2.6%	61/87 (30%)	100/134 (25%)
Wisconsin	University of Wisconsin – Milwaukee	20.4%	24.3%	-3.9%	72/87 (17%)	116/134 (13%)
Wyoming	University of Wyoming	25.1%	19.0%	6.1%	10/87 (89%)	12/134 (91%)

Private Universities are shaded

The numerical rankings are listed, with the percentile rankings in parentheses.

[34] The number of Pell Grant recipients not reported at the institutional level.

References

Ashenfelter, O., C. Harmon, & H. Osterbeek (1999). "A Review of Estimates of the Schooling/Earnings Relationship, with Tests for Publication Bias." *Labour Economics* 6(4):453-470.

Berkner, L., He, S., Lew, S., Cominole, M., & Siegel, P. (2005). *2003–04 National Postsecondary Student Aid Study (NPSAS:04) Student Financial Aid Estimates for 2003–04* (NCES 2005–158). U.S. Department of Education, National Center for Education Statistics. Washington, DC.

Binder, Denis. "The Disinvestment in Public Higher Education," Chapman University School of Law, 2006.

Clinedinst, Melissa. *Investing in America's Future: Why Student Aid Pays Off for Society and Individuals*. The Institute for Higher Education. May 2004.

College Board. *Pell Grant Status Report: Trends in Student Aid 2004*. October 2004.

College Board. *2006 Trends in Higher Education Series: Pell Grants*.

Couturier, Lara K. *Convergence: Trends Threatening to Narrow College Opportunity in America*. The Institute for Higher Education Policy. April 2006.

Curs, Bradley; Larry D. Singell & Glen R. Waddell. "Money For Nothing? The Institutional Impact of Changes in Federal Aid Policy." September 6, 2005.

Dorans, N; Houston, W.; Lyu, C.F.; & Pommerich, M. "Concordance Between ACT Assessment and Recentered SAT I Sum Scores" *College and University*, Volume 73 (2) pg. 24-35, Fall 1997.

Gerald, Danette & Kati Haycock. (2006) "Engines of Inequality: Diminishing Equity in the Nation's Premier Public Universities." *The Education Trust*.

Haveman, Robert & Barbara Wolfe. 1984. "Schooling and Economic Well-Being: The Role of Non-Market Effects." *Journal of Human Resources* 19 (3, Summer): 377–407.

Haveman, Robert & Kathryn Wilson. 2007. "Economic Inequality in College Access, Matriculation, and Graduation" In *Economic Inequality and Higher Education: Access, Persistence and Success*, edited by Stacy Dickert and Ross Rubenstein. New York: Russell Sage Foundation.

Heller, Donald. "Pell Grant Recipients in Selected Colleges and Universities" in Richard Kahlenberg ed. *America's Untapped Resources: Low-Income Students in Higher Education* (New York: Century Foundation Press, 2004)

Lord, Mimi. "Trends and Issues: Valuing, Measuring, and Financing Higher Education in the 21st Century." *TIAA-CREF Institute*. December 2006.

Mortenson, Tom. "Pell Grant Share of Undergraduate Enrollment at the 50 Best National Universities - 1992-93 and 2001-02." *Postsecondary Education Opportunity*, March 2004.

National Association of State Student Grant and Aid Programs (NASSGAP). *35th Annual Survey Report on State-Sponsored Student Financial Aid: 2003-2004 Academic Year.*

Tebbs, Jeff & Turner, Sarah. 2005. "College Education for Low Income Students: A Caution on the Use of Data on Pell Grant Recipients," *Change* (June).

Wolfe, Barbara & Robert Haveman. 2003. "Social and Nonmarket Benefits from Education in an Advanced Economy." In *Education in the 21st Century: Meeting the Challenges of a Changing World*, edited by Yolanda Kodrzycki. Boston: Federal Reserve Bank of Boston.

Websites Accessed:

www.census.gov

www.economicdiversity.org

www.fns.usda.gov/cnd/lunch

www.nces.ed.gov

www.studentaid.ed.gov