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James Monks
University of Richmond

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Socioeconomic diversity in tertiary education has come under increased scrutiny over the past few years. Policy makers and practitioners within higher education have devoted greater attention to encouraging more low-income students to pursue a college degree. This paper estimates the influence of prices (both sticker-price and net price), financial aid policies, and selectivity on the matriculation decisions of low-income students, across postsecondary institutions. All three factors are significant in determining the representation of Pell grant recipients as a percent of an institution's entering class. A focus on net price, while important, ignores the significant influence of sticker-price (shock), selectivity, and financial aid policies on low-income students' enrollment decisions, particularly at private institutions.

Keywords

higher education, low-income students, enrollment, tuition, financial aid

Comments

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**Institutional Variation in Enrollment of Low-Income Students:
The Role of Prices, Financial Aid Policies and Selectivity**

by

James Monks

Department of Economics

University of Richmond, VA 23113

jmonks@richmond.edu

October 2013

**Institutional Variation in Enrollment of Low-Income Students:
The Role of Prices, Financial Aid Policies and Selectivity**

Abstract

Socioeconomic diversity in tertiary education has come under increased scrutiny over the past few years. Policy makers and practitioners within higher education have devoted greater attention to encouraging more low-income students to pursue a college degree. This paper estimates the influence of prices (both sticker-price and net price), financial aid policies, and selectivity on the matriculation decisions of low-income students, across postsecondary institutions. All three factors are significant in determining the representation of Pell grant recipients as a percent of an institution's entering class. A focus on net price, while important, ignores the significant influence of sticker-price (shock), selectivity, and financial aid policies on low-income students' enrollment decisions, particularly at private institutions.

Introduction

Tertiary institutions in the United States have recently come under increasing pressure and scrutiny to enroll an economically diverse student body. Rising levels of student borrowing and defaults on student debt, in the context of escalating tuition and uncertainty regarding the job prospects of college graduates, have prompted some critics of higher education to question whether colleges and universities are doing enough to assure that a bachelor's degree is accessible and affordable for low-income students. While racial diversity and affirmative action have been at the forefront of legal challenges to university admissions practices, this attention has led to questions on whether universities are, or at least ought to be, focusing more on socio-economic diversity rather than racial diversity.

In a recent New York Times article, David Leonhardt (2011) pointed out that while many selective universities have made tremendous strides in increasing diversity along other fronts (religious, racial, gender), their student bodies remained “shockingly affluent.” He noted that in 2003 at the University of Michigan more students came from families earning at least \$200,000 a year (approximately the top 4 percent of the income distribution), than enrolled from the bottom half of the income distribution. Similarly, according to an analysis by Hill and Winston (2006a) approximately ten percent of the students enrolled at a set of private, highly selective colleges and universities (the COFHE schools) were from the bottom forty percent of the U.S. family income distribution. Carnevale and Strohl (2010) analyzed data from the National Educational Longitudinal Survey (NELS) and found that only seven percent of high school graduates from the bottom quartile of socio-economic status complete a baccalaureate degree. Clearly, low-

income students are under-represented at post-secondary institutions and in particular at highly selective colleges and universities in the United States.

Anthony Marx, the former president of Amherst College, made socio-economic diversity and the enrollment of low-income students the cornerstone of his initiatives during his term as president at the small, private, highly selective college. In 2003, shortly after Marx arrived at Amherst, only 13 percent of the student body received Pell grants. By 2011, over 22 percent of Amherst's students were Pell grant recipients. Marx credits this increase in enrollment of low-income students to a very concerted and direct effort to provide greater opportunities to low-income students via changes in financial aid policies, admission practices, and recruitment efforts.

A recent study by Stephen Burd of the New America Foundation (2013), criticizes many selective colleges and universities for not doing enough to enroll more low-income students. His primary argument is that too many colleges and universities are emphasizing selectivity, test scores, and net tuition revenue over socio-economic diversity. Specifically, he criticizes the high sticker price – high aid model coupled with increasing merit aid, as benefiting upper-income students at the expense of lower-income students who need higher levels of need-based aid. He singles out individual institutions for enrolling low levels of Pell grant recipients, implying they are not doing enough to provide opportunities for low-income students.

The above outlined facts and discussion indicate that there is a growing interest in whether post-secondary institutions are doing enough to enroll low-income students. Unfortunately, most of the discussion and analyses do not account for the complexity and multitude of factors that influence the level of enrollment of low-income students across

institutions. Clearly, price plays an important role in determining an institution's affordability for low income students, but even here both sticker-price and net price may be important. Similarly, specific financial aid and admissions policies may be important in low-income students' enrollment decisions. Institutional setting is likely to significantly influence an institution's ability to attract low-income students based on the supply of students from lower socio-economic rungs of the ladder. Additionally, because of the strong correlation between income and pre-college academic preparation, particularly as measured by standardized test scores, institutional selectivity and quality are likely to play a significant role in determining an institution's ability to attract and enroll low-income students.

This paper investigates the role that institutional quality, pricing, and aid policies play in determining variation in enrollment of low-income students across post-secondary institutions in the United States.

Literature Review

There is a small but growing body of literature related to socioeconomic diversity in higher education and efforts focused on enrolling low-income students.

A number of the studies examining enrollment of low-income students simply attempt to chronicle the number of low-income students enrolled in postsecondary institutions and the percent of the student body that they represent. For example, Carnevale and Rose (2004) report that 74 percent of the students at the top 146 most selective colleges and universities came from the top quartile of the socioeconomic status (SES) distribution,. Only 3 percent came from families in the bottom quartile of socioeconomic status, and approximately 10 percent of students at the most selective institutions came from the bottom half of the SES distribution. Similarly,

Hill and Winston (2006a and 2006b) utilize data from the Consortium on Financing Higher Education (COFHE), a set of 31 private, highly selective colleges and universities. They find that 10 percent of students at this set of institutions came from the bottom 40 percent of the U.S. income distribution. Clearly low-income students are under-represented at selective colleges and universities in the United States.

A recent study by Stephen Burd (2013) has garnered significant attention. This analysis identifies individual institutions that enroll a large proportion of low-income students, as measured by Pell grant receipt, and those institutions that appear to under-perform in enrolling low-income students. He posits that colleges spend too many resources attempting to attract and enroll high ability and wealthy students at the expense of low-income students. He argues that universities are using “their institutional financial aid as a competitive tool to reel in the top students, as well as the most affluent, to help them climb up the *U.S. News & World Report* rankings and maximize their revenue.”

Other analyses have attempted to estimate the impact of specific policies on low-income student matriculation decisions. Specifically, Linsenmeier, Rosen, and Rouse (2006) analyzed a particular private, research university’s decision to eliminate loans for all students. They found that this did not significantly increase enrollment of more low-income students in general, but that it did have a positive and significant impact on the matriculation rate of low-income minority students. Waddell and Singell (2011) investigated no-loan policies at a set of public-institutions and concluded that eliminating loans from financial aid packages significantly increases the enrollment of low-income students and increases the percentage of the class that received Pell grants. Hillman (2012) used a difference-in-difference estimation approach to determine if no-loan policies increased low-income enrollment. He focused exclusively on

selective colleges and universities. His analysis found that eliminating loans had a statistically significant impact on enrollment of Pell grant recipients, although the magnitudes of the effects were not particularly large. Introducing a no-loan policy increased enrollment of Pell grant recipients by 1.3 percentage points at private institutions, and 1.8 percentage points at public institutions, relative to institutions that continued to package loans with their financial aid.

Perna, Lundy-Wagner, Yee, Brill, and Tadal (2010) discuss the role and importance of communication strategies in implementing a no-loan policy. They outline various communication and media approaches to ensure that an institution's no-loan and financial aid policies are effectively communicated and have the greatest efficacy in encouraging low-income students to apply and enroll at an institution.

Other recent studies have focused on the supply of high-ability, low-income students. Pallais and Turner (2006) examine the prevalence of high test (SAT and ACT) scores among various income groups. They also scrutinize the likelihood of high-ability, low-income students sending their scores (as a proxy for their likelihood of applying) to a top-tier private or flagship public university. They find that, generally, high-ability, low-income students are less likely to send their scores to a top-tier university than are their high-income peers. The fact that low-income students are less likely to perform well on standardized tests, coupled with the result that low-income students of all ability levels are less likely to apply to a top-tier institution presents an acute challenge to selective institutions in attracting low-income, high-ability students.

In related studies, Tebbs and Turner (2006) and Turner (2005) discuss the difficulties for public flagship universities in enticing low-income students to enroll. In particular, these studies examine the AccessUVA program designed to increase enrollment of low-income students at the

University of Virginia. This program was designed to allow the University of Virginia greater flexibility in setting tuition and pricing policies in exchange for targeting greater resources and recruiting efforts on low-income students. They report rather modest increases in enrollment of low-income students, at least in the first few years of the program.

The studies outlined above illustrate that there is increased interest in the enrollment patterns of low-income students. They also reveal that the primary focus to date has concerned the enrollment patterns of low-income students at highly selective institutions. This paper will contribute to the literature by examining enrollment of low-income students across a wider cross-section of tertiary institutions, and not just highly selective institutions. Additionally, rather than focusing on a single financial aid practice, such as eliminating loans, this analysis will control for a number of institutional characteristics and financial aid policies in examining how they influence enrollment decisions of low-income students in deciding where to attend.

Data

The data for this analysis comes from the College Board's 2011 Annual Survey of Colleges (ASC) merged with the 2011 Integrated Postsecondary Education Data System (IPEDS) database. The ASC data set contains survey responses from 3,920 accredited undergraduate colleges and universities across the United States. To be eligible for this survey an institution must offer at least an associate's degree and be accredited by a regional or national accrediting agency recognized by the U.S. Department of Education. The Annual Survey of Colleges sample represents over 85 percent of the 4,599 degree granting institutions in the United States, as reported in the 2011 U.S. Digest of Education Statistics.

In order to assess the importance of various institutional characteristics on the enrollment of low-income students at traditional, four-year institutions the sample is further restricted (see Table 1). I eliminate for-profit institutions in this survey (892 institutions), and institutions whose highest degree awarded is an associate's degree (1,040). I also eliminated observations where important variable values were not reported. Specifically, I omit observations where the institution did not report the percent of the class receiving financial aid or the reported percent was greater than 100 percent (1,004), or the percent of need met with financial aid and/or the cost of attendance (50) were not reported. These restrictions result in a final sample of 891 four-year, baccalaureate degree or higher awarding, accredited institutions, with valid data on the financial aid profile of their entering classes.

The primary focus of this analysis concerns enrollment of low-income students at four-year non-profit colleges and universities. For this analysis, low-income is defined and measured as those students who receive Pell grants. According to the 2011-2012 Federal Pell Grant Program End-of-Year Report by the U.S. Department of Education's Office of Postsecondary Education, 74.3 percent of Pell grant recipients came from families earning less than \$30,000 a year, and over 92 percent came from families earning less than \$50,000 a year. Median household income for 2011 was \$50,502 in the United States.

The sample of institutions used in this analysis enrolled an entering class that was 31.18 percent Pell grant recipients, on average across institutions (see Table 2 for summary measures). This ranged from a low of only 6 percent to a high of 100 percent of the entering classes receiving Pell grants. Among public institutions the average was 32.9 percent, while at private institutions the average was 30.2 percent. According to the College Board (2013), 36 percent of postsecondary students received a Pell grant in the 2010-2011 academic-year. The College

Board figure is likely higher than the sample average in this paper because it includes enrollment at two-year and for-profit institutions.

Additional variables used in this analysis include dummy variables indicating whether the institution admitted its 2010-2011 fall class in a need-blind manner (that is they did not consider an applicant's financial aid profile in determining whether to admit them or not), and if they met the full demonstrated need of all admitted students. Meeting-full-need means that all of the difference between the tuition, room, and board of an institution and what a family is expected to contribute for their child's higher education expenses is met with grant aid, loans, or work-study. The opposite of meeting-full-need is called "gapping". The degree or percent to which an institution gaps its students, on average, is also used as a control variable in this analysis. The expectation is that the more an institution gaps its students the less likely it should be to enroll more low income students, *ceteris paribus*. As meeting-full-need can be achieved with varying degrees of loans versus grant aid, I also include a dummy variable indicating whether an institution has a policy of no-loans for all students, such that all of a student's demonstrated need is met with grant aid, or a policy of limited loans, such that students below a certain income threshold have all of his or her need met with grant aid, as defined by *The Project on Student Debt* for 2009-2010. An additional institutional control variable used is the median SAT score of the entering class. The higher the SAT score of the class the more affluent the student body generally, given the high, consistent and positive correlation between family income and standardized test scores, and thus the lower expected number of Pell recipients. I use the total cost of attendance (tuition, fee, room, board, books and expenses) to measure the sticker-price of an institution. For public universities I use an undergraduate enrollment weighted average of the in-state and out-of-state cost of attendance. Net price is measured in two ways: 1.) the average

net price for low-income families (those with family income less than \$30,000); and, 2.) the institution's average net price among students receiving any grant aid. The first better captures the price paid on average for the least well off students, almost all of whom would be eligible for Pell grants, while the latter represents the net price paid by a larger percent of the students who are eligible for Pell grants. I also include total expenditures per student in order to examine whether institutions with greater resources utilize that wealth to attract low income students by offering more amenities and services attractive to low-income students. All dollar based regressors are entered in natural log form to approximate percentage changes in these variables. I also include among the independent variables in the following analyses the percent of all graduates who obtained degrees in majors with above median earnings. These majors were identified from the *Center on Education and the Work Force's* 2012 analysis of earnings by college major. The majors with above median earnings are engineering, mathematics and statistics, physical sciences, science technologies, social sciences, health professions, and business. Controls for public versus private institutions, highest degree awarded, and institutional size are also utilized in the following analyses.

I control for variation in the supply of low income students available to an institution by including state-level dummy variables and dummy variables for urban and suburban (versus rural) location of the institution.

Empirical Results

There are a number of institutional characteristics that are significantly related to an institution's ability to attract and enroll low-income students. Table 3 presents the results of regressions of the percent of the 2011 entering class that received Pell grants against the control

variables discussed above, for all 891 institutions included in this sample. The average net price charged to students from families earning less than \$30,000 per year has a negative and statistically significant (at the 99 percent level) influence on the enrollment of low income students. The coefficient on the natural log of low-income net price of $-.889$ indicates that a 10 percent decrease in net price for low-income students would only lead to a $.0889$ percentage point increase in enrollment of Pell grant recipients, as a percent of the entering class. So while low-income net price is statistically significant in determining the percent of the entering class that receives Pell grants, the magnitudes of the effects are rather small in terms of substantially altering the percent of the class that is low-income.

Additionally, an institution's cost of attendance, or sticker price, plays a statistically significant role in influencing enrollment of low-income students. Even though low-income students would virtually never pay the full cost of attendance, institutions with higher cost of attendance charges have significantly fewer Pell grant recipients, other things equal. In this case, the coefficient of -9.7 indicates that a ten percent increase in sticker price would be predicted to lead to just under a one percentage point decrease in enrollment of Pell grant recipients as a percent of the entering class.

On the other hand, expenditures per student have a positive and statistically significant, impact on enrollment of low-income students. The coefficient on expenditures per student of 5.135 indicates that an increase in expenditures per student, conditional on sticker price and net price for low-income students, entices significantly more low-income students to enroll. This may be due to the fact that low-income students recognize the benefits, in terms of services and amenities, that greater resources can provide.

Conditional on prices and expenditures, there are two financial aid policies that are significant in attracting low-income students. Being both need-blind and meeting-full-need results in enrolling a class with over 3 percentage points more Pell grant recipients than an institution with the same sticker price and net price, but without this institutional commitment. There are only 46 institutions in the United States that commit to these policies on a consistent basis, but doing so appears to send a strong signal to Pell grant recipients that they are committed to enrolling and assisting low-income students. Similarly, committing to limiting or eliminating loans from the financial aid package offered to low-income students significantly increases enrollment of Pell grant recipients. It is worth emphasizing that these effects are conditional on the net price offered to students from families with income less than \$30,000. Being need-blind and meeting-full need and eliminating loans for low-income students sends a clear policy signal to applicants that an institution is committed to being accessible and affordable to low-income students. On the other hand, meeting-full need (without being need blind) and the degree of gapping do not have statistically significant influences on enrollment of Pell grant recipients.

An institution's selectivity, as measured by average SAT score, has a negative and statistically significant impact on enrollment of Pell grant recipients as a percent of the entering class. Each one hundred point increase in the average SAT score (out of the two test maximum of 1600 points) leads to an 8.587 percentage point drop in the percent of the entering class that receives a Pell grant. The high correlation of family income with standardized test scores limits the supply of high academic ability students (as measured by standardized test scores such as the SAT) available to highly selective institutions.

Institutional type also plays a role in enrollment of low-income students. While unconditionally public universities have a higher percent of their entering class receiving Pell

grants, conditional on the factors controlled for in these regressions, public institutions enroll significantly fewer Pell grant recipients than private institutions. Similarly, masters universities enroll fewer Pell recipients than baccalaureate colleges, and larger institutions, in terms of undergraduate enrollment, have fewer low-income students as a percent of the entering class.

There appear to be significant location effects, as well. Institutions located in urban areas have 2.12 percentage points more Pell grant recipients, while colleges and universities located in suburban areas have 1.46 percentage points fewer Pell recipients than rural institutions. Similarly, a subset F-test (test statistic=4.9; p-value < .001) on a set of state dummy variables rejects the null that the coefficients on the state dummy variables are equal to zero. These results suggest that the supply of low-income students as proxied by the state in which an institution is located and its metropolitan setting have a significant influence on its ability to enroll low-income students.

Specification (2) of Table 3 replaces the net price charged to low-income students with the net price charged to all students receiving financial aid at the institution. Enrollment of Pell recipients is even more responsive to this measure of net price. A ten percent increase in net price is predicted to decrease the proportion of the entering class that receives Pell grants by over .4 percent; this estimate is statistically significantly different from zero at the 99 percent level. The cost of attendance is once again found to have a significant effect on the enrollment of low-income students. In this case, the magnitude of sticker-price and net price are quite comparable.

All of the other results are qualitatively similar to those from specification (1), with the exception of the influence of being need-blind and meeting-full-need. Even here the coefficient is still positive, indicating that adhering to this policy is predicted to increase low-income

enrollment, but the coefficient is no longer significantly different from zero, at conventional levels.

Overall, both net price (for low-income students and all students receiving grant aid) and sticker price significantly influence enrollment of low-income students. Institutional selectivity and some financial aid policies, such as limiting loan levels, also appear to play an important role in determining who enrolls. All of the above results were estimated on the full sample of 891 institutions utilized in this analysis. A Chow test for equality of effects between public and private institutions rejects the null of equal coefficients across the two higher education sectors (Chow test statistic is 1.53 (p-value < .01) for specification (1) and 1.35 (p-value < .05) for specification (2); numerator df=68, denominator df=755). The results of separate regressions for public versus private institutions are presented in Tables 4 and 5.

Table 4 presents the separate regressions by higher education sector controlling for the net price charged to low-income families. The first column provides the results for the 329 public universities in the sample. Once again, the natural log of net price for families earning less than \$30,000 per year has a negative and statistically significant (at the 90 percent level) impact on enrollment of Pell grant recipients. The magnitude of the effect is, however, once again quite small. A ten percent increase in net price charged to low-income families is predicted to reduce their representation among the entering class by .1 percent. The natural log of the cost of attendance (sticker-price) does not have a significant impact on enrollment of Pell grant recipients at public universities. Sticker-prices at public universities, which are usually much lower than sticker-prices at private institutions, do not appear to deter low-income enrollment conditional on the net price charged to low-income students.

Expenditures per student have a positive and statistically significant (at the 99 percent level) influence on low-income enrollment and the magnitude at public institutions is even larger than overall. There were only three institutions identified by the *U.S. News and World Report* (2010) as being need-blind and meeting-full need (SUNY College of Environmental Science and Forestry, University of North Carolina-Chapel Hill, and the University of Virginia), and none that met-full need only, so it is not surprising that these policies were not found to be statistically significant in enrolling low-income students at public institutions. Similarly, the percent of gapping was not found to have a significant impact on enrollment of Pell grant recipients.

Eliminating loans for low-income students at public universities has a positive effect on low-income enrollment, but the magnitude is not significantly different from zero at conventional levels. The p-value on this coefficient is .106, in a two-tailed test, providing weak evidence of a positive relationship between Pell grant recipient enrollment and a no-loan policy, conditional on net price at public universities.

Average SAT scores were once again found to play an important role in limiting the enrollment of low-income students. Public institutions with high average SAT scores enroll substantially fewer Pell grant recipients than comparable institutions that are much less selective in terms of test scores. Public universities with larger student bodies were also found to enroll significantly fewer low-income students as a percent of the entering class than smaller institutions, but again the magnitude of the effect was rather modest.

Among the 329 public universities utilized in this sample, only the net price charged to low-income students, expenditures per student, FTE undergraduate enrollment, and average SAT

score were found to be statistically significant in determining the percent of the entering class that received Pell grants.

Column two of Table 4 presents the results for the sample of 562 private colleges and universities used in this analysis. Low-income net price has the expected negative and significant (at the 90 percent) relationship with Pell grant enrollment. The impact of the cost of attendance, or sticker-price, on Pell grant enrollment at private institutions is rather substantial relative the magnitudes of the other price effects reported here. A ten percent increase in the cost of attendance is expected to reduce Pell grant enrollment as a percent of the entering class by almost two percentage points. The magnitude of the effect of sticker price relative to the estimated effect of net price on low-income enrollment suggests that a practice of high sticker price-high aid may not be effective in attracting low-income students. The sticker price appears to be discouraging more low-income students from enrolling than a lower net price can do to attract low-income students. Higher expenditures per student, *ceteris paribus*, are found to consistently increase enrollment of Pell grant recipients.

At private institutions, where being need-blind and meeting-full need is more prevalent (but still rare), this practice has a positive influence on enrollment of Pell grant recipients, although this result is not statistically significant. The higher the percent of gapping an institution practices the lower the level of low-income enrollment, as expected. While limiting loans for low-income students is estimated to have a positive influence on Pell grant enrollment, this impact is not statistically significantly different from zero, at conventional levels.

Higher average SAT scores results in lower levels of low-income enrollment at private institutions, as well, although the magnitude of the effect is less pronounced than at public

institutions. Each 100 point increase in average SAT scores leads to a 7.08 percentage point drop in Pell grant recipients, as a percent of the entering class at private institutions, versus a 9.65 percentage point drop at public universities.

While larger public institutions had lower levels of Pell grant representation, the influence of enrollment at private institutions is not significant. Similarly, institutional type (masters and doctoral versus baccalaureate) and the mix of degrees awarded were not found to be significant in determining low-income enrollment at private institutions. Suburban institutions are predicted to have a lower percentage of Pell recipients than rural institutions, and this result is significant at the 95 percent level.

Table 5 presents the results separately by higher education sector controlling for the net price charged to all grant recipients. The influence of net price on enrollment of Pell recipients is much larger than the estimated effects of the net price charged to the lowest income families. At public institutions the coefficient on the net-price charged to all aid recipients is -3.8. This implies that a 10 percent increase in net price, for example, would be predicted to decrease the percent of the entering class that receives Pell grants by just under .4 percent. On the other hand, the total cost of attendance, or sticker-price, does not have a significant impact on the enrollment of low-income students at public universities.

The natural log of expenditures per student has a positive and statistically significant (at the 99 percent level of significance) impact on the enrollment of low income students, at public universities. Even conditional on net price and the cost of attendance expenditures per student have a substantial influence on attracting and enrolling Pell recipients. Similarly, following a policy of eliminating or limiting loans for low-income students significantly (at the 90 percent

level) increases enrollment of Pell grant recipients. Public universities that have a restricted loan policy enroll on average 2.8 percentage points more Pell grant recipients than comparable institutions without such a policy. On the other hand, neither being need-blind and meeting-full-need nor the percent of gapping have a significant influence on enrollment of low-income students.

At public universities, the larger the student body the lower the percent of the entering class that is composed of Pell recipients. A quadratic in the number of full-time-equivalent undergraduates was not found to be significant, and thus excluded from the regression. Once again, the higher the average SAT scores of an institution the lower the enrollment of low-income students. Specifically, a one hundred point increase in average SAT scores lowers the percent of the entering class that receives Pell grants by over 9 percentage points.

Institutional type (masters, doctoral, or baccalaureate) and location (urban, suburban, or rural) were not found to have a statistically significant influence on the variation in enrollment of low-income students across public universities.

Column 2 of Table 5 presents the results controlling for net price at private colleges and universities. Here too net price has a negative and statistically significant effect on Pell grant enrollment. For example, a ten percent increase in net price reduces enrollment of low-income students as a percent of the entering class by approximately half a percent. For private institutions the sticker-price, or total cost of attendance, is statistically significant in discouraging low-income student enrollment. A ten percent increase in sticker-price is expected to decrease the percent of the entering class on Pell grants by approximately one percentage point.

Expenditures per student have a positive and significant influence on enrollment of low-income students at private colleges and universities, even conditional on prices.

Once again, institutional selectivity as measured by average SAT scores has a negative and statistically significant impact on enrollment of Pell grant recipients. A one hundred point increase in average SAT lowers the percent of the entering class receiving Pell grants by over seven percentage points, at private institutions. The only other statistically significant determinant of low-income enrollment at private institutions is being located in a suburban setting. Being in a suburban location lowers the predicted percent of the class receiving Pell grants by almost 2.5 percentage points.

Conclusion

In summary, the average net price charged to low-income students, those with family income less \$30,000 per year, was found to have a negative and statistically significant influence on enrollment of low-income students. Similarly, the average net price charged to all aid recipients was also found to be negatively related to low-income enrollment. The magnitudes of both of these effects, however, were quite modest. Additionally, the sticker-price, or total cost of attendance, which includes tuition, fee, room, and board, was found to have a negative and significant impact on enrollment of low-income students at private institutions, but not at public institutions. Similarly, being need-blind and meeting-full need in admissions has a positive and significant effect on enrollment of Pell grant recipients, while gapping has a negative and significant impact on low-income enrollment, at private institutions, in certain specifications. These financial aid policies were not found to be significant in affecting enrollment of low-income students at public universities, conditional on net price.

There is weak support for the argument that eliminating loans for low-income students increases enrollment of Pell grant recipients, conditional on net price. The estimated impact of eliminating loans was always found to be positive, but was only statistically significant in the combined sample of public and private universities, or when controlling for net price at public institutions.

Expenditures per student were found to have a consistent, positive, and significant influence on enrollment of low-income students. Conditional on sticker-price and net price, expenditures per student appear to attract low-income students to an institution. Similarly, higher average SAT scores results in fewer Pell grant recipients as a percent of the entering class. This makes it more difficult for highly selective institutions to matriculate low-income students, other things equal.

These results suggest that price, both net price and sticker-price, play an important role in determining where low-income students choose to enroll. These results also suggest that the model of high price-high aid practiced by many private institutions may lead to discouraging more low-income students from enrolling than it does entice them through generous financial aid packages, at least at private institutions. Private institutions seeking to develop greater socioeconomic diversity on campus may wish to experiment with alternative pricing models, such as guaranteeing no or low costs for students below an income threshold. Similarly, a commitment to being need-blind and meeting full need (and thus not gapping) and limiting loans may help institutions with the resources to follow these policies attract more low-income students.

One of the most consistent and difficult challenges facing postsecondary institutions is overcoming the Gordian knot between SAT scores and family income. Institutions firmly committed to socioeconomic diversity may need to place less emphasis on standardized test scores in admitting students, or devote greater resources in seeking out high ability, low-income students.

This paper illustrates that increasing enrollment of more low-income students is not simply a matter of lowering net price. Cost of attendance, expenditures, selectivity, and financial aid policies all play a role in influencing where low-income students choose to matriculate. Supply-side factors such as institutional location also are important in determining low-income enrollment. College and university administrators seeking greater socioeconomic diversity must develop a comprehensive, multi-pronged approach to attracting low-income students.

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Table 1**Sample Construction**

Total Sample	3920
Less:	
For-profits	892
Highest Degree Associates	1040
Pct. of class with financial aid not reported or greater than 100%	1004
Pct. of need met or cost of attendance not reported	93
Final Sample	891

Table 2**Summary Measures**

	<u>Minimum</u>	<u>Maximum</u>	<u>Mean</u>	<u>Std. Deviation</u>
Percent of students with Pell grants	6	100	31.18	14.10
Public institution	0	1	0.37	0.48
Net price for low-income	\$0	\$38,975	\$13,445	\$5,973
Net price for all aid recipients	\$0	\$42,882	\$18,546	\$6,940
Cost of attendance	\$8,986	\$58,334	\$33,303	\$12,520
Expenditures per student	\$5,291	\$270,834	\$25,704	\$21,824
Need-blind/Meet-full-need	0	1	0.04	0.20
Meet-full-need (only)	0	1	0.02	0.14
Percentage of gap	0	99	25.64	17.12
No. of FTE undergraduates	129	46,994	5,571	6,733
SAT mid-point	760	1515	1100.34	135.93
Percent high paying majors	0	1	.43	.16
4-yr graduation rate	0	92	42.90	22.24
Masters institution	0	1	0.36	.48
Doctoral institution	0	1	0.47	.50
Urban location	0	1	0.29	0.45
Suburban location	0	1	0.48	0.50

Table 3
Regression results
Dependent variable is percent of entering class receiving Pell grants

	<u>Spec. (1)</u>		<u>Spec. (2)</u>	
Constant	190.060 (21.716)	***	169.541 (20.751)	***
Natural log of low-income price	-0.889 (0.332)	***	-----	
Natural log of net price	-----		-4.216 (0.473)	***
Natural log of cost of attendance	-9.700 (2.388)	***	-4.781 (2.287)	**
Natural log of expenditures per student	5.135 (0.852)	***	4.859 (0.809)	***
Need-blind/Meet-full-need	3.773 (1.694)	**	2.640 (1.629)	
Meet-full-need only	0.401 (2.801)		0.484 (2.632)	
Percent gap	-0.006 (0.018)		0.002 (0.017)	
Limited loan policy for need-based aid	3.554 (1.064)	***	3.745 (1.010)	***
Pct. of grads in high-paying majors	2.930 (2.376)		3.215 (2.262)	
No. of FTE undergraduates (in 1,000s)	-0.156 (0.043)	***	-0.150 (0.041)	***
SAT mid-point (in 100s)	-8.587 (0.385)	***	-8.204 (0.371)	***
Public institution	-5.922 (1.664)	***	-4.711 (1.592)	***
Masters awarding university	-2.767 (1.378)	**	-2.406 (1.321)	*
Doctoral awarding university	-1.797 (1.370)		-1.645 (1.312)	
Urban location	2.121 (0.820)	***	1.787 (0.787)	**
Suburban location	-1.455 (0.773)	*	-1.736 (0.742)	**
R-squared	.684		.710	
No. of observations	891			

Notes

Standard errors are in parenthesis.

*** (**, *) indicates significance at the 1 (5, 10) percent level.

Included among the regressors but not shown are dummy variables for state, and missing values for average SAT and expenditures.

Table 4
Regression Results by sector controlling for net price for low income students
Dependent variable is percent of entering class receiving Pell grants

	<u>Public</u>		<u>Private</u>	
Constant	88.852 (47.758)	*	286.492 (25.341)	***
Natural log of low-income price	-0.987 (0.540)	*	-1.029 (0.539)	*
Natural log of cost of attendance	-0.370 (5.476)		-18.929 (2.862)	***
Natural log of expenditures per student	6.547 (1.485)	***	3.835 (1.223)	***
Need-blind/Meet-full-need	1.400 (4.436)		3.460 (2.153)	
Meet-full-need	-----		0.883 (2.319)	
Percent gap	-0.002 (0.030)		-0.062 (0.027)	**
Limited loans policy for need-based aid	2.798 (1.724)		1.931 (2.278)	
Pct. of grads in high-paying majors	1.775 (5.052)		2.020 (2.404)	
No. of FTE undergraduates (in 1,000s)	-0.196 (0.070)	***	0.008 (0.104)	
SAT mid-point (in 100s)	-9.653 (0.697)	***	-7.080 (0.549)	***
Masters awarding university	-0.522 (4.488)		-1.310 (1.199)	
Doctoral awarding university	-0.363 (4.427)		-0.693 (1.228)	
Urban location	2.083 (1.366)		1.838 (1.218)	
Suburban location	-0.565 (1.303)		-2.828 (1.122)	**
R-squared	.723		.687	
No. of observations	329		562	
Chow test statistic (num df=68, den df=755)	1.53			

Notes

See Table 3.

Table 5
Regression Results by sector controlling for net price for aided students
Dependent variable is percent of entering class receiving Pell grants

	<u>Public</u>		<u>Private</u>	
Constant	67.916 (44.458)		248.011 (26.522)	***
Natural log of net price for aided students	-3.816 (0.693)	***	-5.379 (1.170)	***
Natural log of cost of attendance	4.083 (5.038)		-10.717 (3.441)	***
Natural log of expenditures per student	6.384 (1.404)	***	3.288 (1.183)	***
Need-blind/Meet-full-need	1.018 (4.228)		2.486 (2.152)	
Meet-full-need	-----		1.319 (2.243)	
Percent gap	-0.001 (0.028)		-0.039 (0.027)	
Limited loans policy for need-based aid	2.800 (1.626)	*	3.639 (2.302)	
Pct. of grads in high-paying majors	3.009 (4.763)		1.631 (2.367)	
No. of FTE undergraduates (in 1,000s)	-0.193 (0.067)	***	0.027 (0.102)	
SAT mid-point (in 100s)	-9.158 (0.667)	***	-7.114 (0.540)	***
Masters awarding university	-0.709 (4.278)		-1.263 (1.180)	
Doctoral awarding university	-0.904 (4.220)		-0.599 (1.210)	
Urban location	1.647 (1.300)		1.882 (1.203)	
Suburban location	-1.063 (1.246)		-2.472 (1.105)	**
R-squared	.749		.698	
No. of observations	329		562	
Chow test statistic (num df=68, den df=755)	1.35			

Notes

See Table 3.